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Index to Volume XLI

A

Accident prevention
  Appliances, 31
  Competition as a factor, 284
  Education in, 36
  Shipbuilding, 171
Accidents
  Building construction and demolition, 218
  Causes analyzed, 233
  Charts of causes, 183
  Coal mine fatalities, 228
  Coal mining in State of Washington, 62
  Couplings in pile, 86
  Horse-play and, 297
  Industries, 78
  Mines, decrease, 32
  New York traction systems, 132
  Ohio, 234
  Personal injury, Delaware & Hudson Co., 233
  Women in industry, 19
Acetylene
  Charging plants, 188
  Generators, 77, 271
  Wisconsin disasters, 129
Acme projectors, 304
Adamson Mfg. Co., 96
Aerial navigation, 80
Aero Automatic Fire Alarm, 97
Air cleaners, 226
Air compressors, explosions in, 285
Air filters, resistance to flow, 282
Air movement and humidity, 104
Air spaces, 258
Aldrich, W. H., 245
Allen, F. C., jr.
  Pneumatic systems for removal of dust, 226
Aluminum shoes, 95
American Atmos Corporation, 289
American La France Fire Engine Co., 45, 144
  Specialties, 203
American Society of Safety Engineers
  Affiliation with A. S. M. E., 296
  Announcements, 192
  Annual dinner, 28
  April meeting, proceedings, 238
  Codes and Legislation Committee, 296
  December meeting, proceedings, 29
  February meeting 83; proceedings, 133
  June meeting, program, 237
  March meeting, 83; proceedings, 191
  May meeting, proceedings, 295
  May meeting, program, 237
  Membership campaign, 296
  National Education Assn. and, 134
  One year's progress, 68
Amsterdam, 214
Anglmesh guards, 98
Anthracite. *See* Coal
Antiseptic Oil of Salt, 46
Apartment houses, sprinklers, 224, 287
Architectural peculiarities, 180
Arrott Building, Pittsburgh, 77
Atmos Tubular Mask, 106
Autoists vigilance committees for, 79
Automatic sprinklers, 8, 117
Automobile
  Babcock cartoon, 27
  Inner tube explosion, 79
  Safety in driving, 229
  Standard headlights, 77

B

Babcock, F. H., 27
  Safety First cartoon, 122
Backfire, 78
Bakeries, 127
Bald heads and infected towels, 117
Balliet, H. S.
  Electrical hazards and their safeguards, 272
Banash, J. S., 234
Barber, R. A.
  Safety to life in ship operation, 111
Barney, Marian
  Warning cry of caution (verse), 140
Barre, Vt., 184
Bateman, Arthur, 76
Bathing for workers, 60
Beidler, Robert and family, 77
Belt shifter, Kleckler Automatic, 143
Benz, A. W., 139
Beverly, Mass., 78
Bicycles, 87
Blasting with picric acid, 232
Blenio paint, 303
Boilers, 4, 36
  High and low water alarms (letter), 275
  Safety latch, 98
  Steam, 150
Bonsib, R. S., 32
Boston Safety Congress, notice, 230
  Exhibit question, 230
Bostwick Steel Lathe Co., 46
Brandenstein, S. C.
  Safety to life in ship construction, 108
Breathing machine, 245
Briggs, C. A., 90, 298
British compensation costs, 294
British safety conference, 294
Brown, W. S., 43
Brownell, J. R., 39
Building demolition, 215
Building Officials Conference, 125, 182, 239
Building wreckers, historical, 178
Building wrecking methods, 167
Buildings
  Accidents in construction and demolition, 218
  Advice from State Fire Marshal, 282
  Problems discussed, Philadelphia, 292
  Removal of steel building, 57
  Safe construction, 239
  Safe in all ways, 182
  Safer construction, 185
Bullard, E. D., 251
Bulletins, safety, 157
Bureau of Mines, 130
  Explosives, 235
  Safety lamps test, 231
Bureau of Standards
  Head and eye protection code, 67
Burns, dressing, 303
Bus accidents, 81

C

Cables, 173
California
  Industrial Commission, 34
  Safety Engineers, 236
Calumet & Arizona Mining Co., 281
Campbell, Edward
  Efficiency principles and the safety engineer, 11

Canadian safety organization, 294
Cant hook for concrete poles, 189
Canton, Mass., safety sermon, 67
Car wrench, 200
Carboys
  Closing devices, 188
Carefulness, 86
Carelessness, 275
Carnegie Steel Co. safety trophy, 73
Carrier, The, 95
Casinghead gasoline explosions, 101, 127, 129
Census records burned, 39
Chamber of Commerce, International, 287
Chase, F. D., 95
Chemical industries, 38
Chester Park, Cincinnati, 236
Chicago
  Electric railways, 131
  Elevator explosion, 149
  Great fire anniversary, 291
  Safety Council, 79
  Safety supervisors, 187
Chimneys, 3
Cigars, banding, 127
Cincinnati, 236
Cleveland, 239
  Building Officials' Conference, 125, 182, 239
  Heating and Ventilating Engineers, 185
  "Tisco," 190, 203, 251
Cleveland Breathing Machine Co., 201, 245
Cleveland Electrical League, 305
Clothes hanger, 200
Clothing afire, 77
Coal dust explosions, 78, 236
Coal mining
  Accidents in State of Washington, 62
  Fatalities, 228
  Prevention of gas explosion in anthracite mines, 69
  Safety lamps, 187
  Ventilation, 130
Coast Guard, 68
Codes and appliances, connecting, 36
Columbus, O., City Hall, 91
Columns, 64
Combustible materials, ignition by heat-producing apparatus, 256
Compensation, 87
Conard, Otway, 298
Concrete poles, cant hooks for, 189
Convection, 257
Condulets, 46
  New, 96, 201, 203
Connelley, C. B.
  Making of a safety standard, 222
Construction
  Real data for, 64
  See also Buildings
Containers, scrapped, 233
Convection, 257
Copeland, N. R., 245
Copeland, R. S., campaign against rats, 287
Couplings, pile of, 86
Crane cages, 146
Cranes, 172
Crockatt, C. C., 231
Crouse-Hinds floodlights, 96
Cummings, E. W., 43, 139
Cutler-Hammer System, 252

D

Daylight saving, argument for, 51
Dehydration equipment, 283
De Kay, Eckford C., 35
Delaware & Hudson Co., 233
Demolition, 215
  Accidents, 218
  See also Wrecking
Dentist and infected towels, 117
Denver, rubbish court, 291
Derby, J. H., 229, 237
Derby Electric Release, 47
Destructive instinct, 178
Detroit
  Poster for kitchens as to fire alarm boxes, 293
  School ventilation, 274
DeWaters Safety Latch Co., 98
Diamond Point Ladder Shoe, 147
Diamond Sanitary Clothes Hanger, 200
"Doctor says," 157, 158
Documents, protection, 302
Don'ts of the Steel & Tube Co., 235
Dow Wire and Iron Works, 303
Drinking fountains, 199
Dry filters' resistance to air flow, 282
Dunn, B. W.
  Report on gasoline explosion at Memphis, 101, 127
Dust
  Explosion in grain elevator, 149
  Explosions, 283
  Granite, 184
  Pneumatic removal systems, 226
  Sly arresters, 202
Dutch Museum, 214
Dwellings, increasing fire hazard, 178

E

Edison Lamp Works, 97
Education in safety work, 136, 242
"Education in Accident Prevention" (Payne), 35
Edwards, E. S.
  Safety fables in slang, 193
Edwards Non-Fogging Goggle, 251
Efficiency, principles, 11
Electric fuses, 234
Electric heat for industry, 240
Electric irons, fires from, 37
Electric lanterns, 203
Electric lights, 87
Electric railways, Chicago, 131
Electrical appliances, safety in relation to, 206
Electrical hazards and their safeguards, 272
Electrical safety code, 189
Electrical Safety Conference, 118
Elevators
  Frequency of accidents, 75
  Safety feature, 32
  Safety lock failure, 77
Emerson, Harrington, 23
Employers
  Lessons for, 66
  Must heed safety laws, 74
Employers' Mutual Insurance Co., 95
Engineering Research Foundation, 290
Engineers, their part in safety, 279
Estey Sprinklers, 97
Executives, 196
Explosions
  Air compressors, 285
  Fire box gases, 155
  Gas in anthracite mining, 69
  Gasoline tank car at Memphis, 101, 127
  Grain elevator, Chicago, 149
  Home brew, 236
  Indiana coal dust, 78
  Inner tube, 79
  Paint store, 82
Explosives, 235
  Coal-dust, 78, 236
  Liquid oxygen, 59
Eyes, 175
  Head and eye protection, 67
  Miners, American and British, 126
  Motion pictures and, 127

F

Fables in slang, 193
Falling, 183
  Accidents from, 80
  On stairs (cartoon), 18
Father of Railroad Safety, 30
Fatigue, 22
Faust lathe brake, 97
Federal Electric Lanterns, 203
Federated Amer. Engineering Societies, 234, 239
Feralun uses, 147
Films
  Flammable, 37
Fire alarm boxes, kitchen posters, 293
Fire alarms
  Aero Automatic, 97
  Automatic, 96

Fire brigades
Training of private, 52
"Fire Drill and Orders," 36
Fire escapes, 303
Keeping them painted, 125
Fire extinguishers, 250
Fire hazards in dwellings increasing, 178
Fire insurance companies, suggestions to (letter), 276
Fire job, 181
Fire Marshal's advice to builders, 282
Fire prevention education, 186
Fire protection, school houses, 115
Fireklok 96
Firemen
As school teachers, 81
Safety mask, 235
"Fireproof," 23
Fires
Automatic control, 7
Casualties in 1920, 6
Columbus, O., City Hall, 91
Gas control at, 229, 237
Housing problem and (cartoon), 255
Industrial plants, 236
Locomotive sparks, 81
Loss of life in the past, 10
Marine losses, statistics, 159
Recent, and their lessons, 92, 141, 198, 246, 299
Unexpected, 256
Women ushers and, 225
Fireworks in Philadelphia, 288
First aid, 192
Fiske, H. A.
Protecting life by automatic fire control, 7
"Flammable," 23
Fleming, T. A., 255
Fire casualties in 1920, 6
Flinn, A. D., 290
Floors, concrete, under boilers, 153
Forster, H. W.
Loss of life by fire, 10
Fresh air, 87
Frick & Lindsay Co., 199, 200
Frisbie Safety Saw Guard, 147
Furnace door locks, 154
Furnaces, 4
Fuses, 234

G

Gartside, W. H., 35
Gas control at fires, 229, 237
Gases
Fire box, 155
In anthracite mines, 69
Odorless, 33
Gas masks
Atmos Tubular, 106
Demonstration by American-La France Fire Engine Co., 144
Gasoline
Memphis explosion, 101, 127
Gauge cocks, 151
Gauge glass, 151
General Electric Co., 284
Germs, 194
Gibson, W. R., 281
Globe-Wernicke Co., 96
Globes, holders for, 304
Goggles, 38, 157, 158
Locomotive enginemen, 102, 123
Non-fogging, 251
Gorter, R. A., 214
Goucher, E. L., 200
Gould, R. L., 73
Government employes, safety of, 295
Grain elevator explosion, 149
Grand Central Terminal, 272
Granite working plants, 184
Great American Insurance Co., 236
Greenfield, Ohio, 79
Guards
Angimesh, 98
Punch presses, 56, 145
Saw, 41, 147
Wooden, 176

H

Hackett, J. D., 33
Harbors
Oil pollution, 292
Hazards
Electrical, 272
Fire, 178
Marine, 159
Head and eye protection, 67
Heat
Electric, for industry, 240
Phenomena, 257
Heat-producing apparatus hazard, 256
Heating and ventilating, Cleveland meeting, 185
Heating and Ventilating Engineers, convention extended, 234
Heating and ventilating shows, 231
Henlay Publishing Co., 229
Hibben, S. G.
Industrial lighting equipment and its maintenance, 13
Hilleary, Warren, 245
Safety features of steam boiler accessories, 150
Hocking Valley Railway Co., 37
Hoffman, F. L., 287
Hoisting, 185
Hollow tile and housing, 231
Holman, Earl, 33, 74
Holmes (Joseph A.) Safety Assn., 132
Holton, Ethel
Safety First (verse), 140
Horse-play, 297
Horsehair processing, 294
Horses, shipping, 36
Houses
Increasing fire hazard, 178
Should not be built to burn, 2
Housing, fires and (cartoon), 255
Hubbard, C. T.
Making safety bulletins attractive, 157
Hudson River Vehicular Tunnel ventilation, 125
Humidity and air movement, 104
Huston, J. A., 25
Hygiene, personal, 235
Hypochlorite, 291

I

Ice, fighting with steam, 45
Illumination, 13
Imperial Safety Supplies Co., 131, 251
Indiana Harbor, 235
Industrial lighting, 13
Industrial management, 33
Industrial painting, 65
Industrial plants, fires in, 236
Industry, 95
"Inflammable," 23
Insulation, 5
"Ipco," 303

J

Jennyjohn, Mr., 189

K

Keating, H. F., 245
Kenlon, Chief, 229
Kerosene, how not to use, 79
Kennedy, J. J., 298
King (Julius) Optical Co., 49
Kleckler Automatic Belt Shifter, 143
Kuehnle, F. C.
Building Department's viewpoint of safety in demolition, 215
Kurlander, J. H., 278

L

Labor
Claims right to take chances, 36
Orchestration, 23
Ladders
Code, 240
Diamond Point Shoe, 147

Lamps for mines, 187
Language, 23
Lanterns, electric, 203
Larkin, W. H., jr., 245
"Light Touches," 251
Lighting, 13
  Comparative values, 278
Lightning protection, 291, 292
Lilley, F. R., 43
Liquid oxygen explosives, 59
Locomotives
  Gaseous mines, 130
  Goggles for enginemen, 102, 123
  Sparks, 81
Louisiana, 37
Louisville, Ky., theater fire, 286
Luminous paint, 179
Lyon, E. P.
  Humidity and air movement, 104
Lyon Breathing Machine, 201

M

MacAndrews' hymn, 24
McColl, J. R., 274
Mail and Express building dissected, 57
Man on the Job
  Articles and offer, 40, 87, 135, 194, 241, 297
  Comments, 43, 90, 139, 244, 298
  Prizes, won, 43, 90, 139, 245, 298
Management, course in, 33
Marble stair treads, 249
Marine fire hazards, 159
Mask, safety, for firemen, 235
Mason, J. L., 235
  Bathing for workers, 60
Massachusetts
  Safety lectures, 74
  Sprinklers in apartment houses, 224, 287
  Standard headlights, 77
Materials, safe piling, 66
Mechanical safeguarding, 135
Memphis, Tenn., gasoline tank car explosion and conflagration, 101, 127
Mental hygiene of industry, 131
Metal chain for fire protection, 253
Metal mines
  Fatalities in 1919, 186
  Ventilation, 130
Metropolitan Safety Council, school for supervisors, 31
Miami, Okla., 82
Milwaukee
  Assn. of Commerce, 74
Miners
  Eyes, American and British, 126
  Safety chapters, 132
Miners' phthisis, 294
Mines
  Coal mine fatalities, 228
  Decrease in fatal accidents, 32
  Equipment and practice, 37
  Flame safety lamps, 187
  Lamps, 231
  Locomotive for gaseous, 130
  Metal, fatalities in 1919, 186
  Pennsylvania safety, 77
  South Africa, injury rate, 263
  Trolley safety cut-out, 281
  Utah, 78
  Ventilation in coal and metal, 130
  West Virginia safety, 76
Mining
  Anthracite, preventing gas explosion, 69
  Washington (State) coal accidents, 62
Mitchella, C. B., 289
Monkeying with the juice (cartoon), 197
Morale. *See* Man on the job
Mosso (C. A.) Laboratories, 46, 303
Motion pictures and eyes, 127
Motor buses, 81
Mowery, H. W., 68
  Address, presidential, 83
  Obscure but most prolific hazard, 183
Muldaur, G. B.
  Organziation, scope and service of Underwriters' Laboratories, 212

N

National Board of Fire Underwriters, quoted, 255
National Education Assn.
  A. S. S. E. and, 134
National Fire Prevention Assn.
  Reports of officers and committees, 264
  Resolutions adopted June 14 at San Francisco, 267
  San Francisco meeting, 125, 224
  San Francisco program, 205
  Specific demands, 275
National safety code, 67
National Safety Congress, 1921 dates fixed, 230
National Terra Cotta Society, 72
Neuenschwander, Arnold
  Theater audiences in case of fire, 286
New York (city)
  Building demolition, 215
  Fire Department's view of gas control at fires, 229
  Traction accidents, 132
New York (State)
  Building construction and demolition accidents, 218
  Industrial Code, 46
New York Edison Co., 231, 240
Newspaper presses, 252
Non-Slop Guardene, 250
Norfolk, school fire, 182
Northwestern Pacific R. R., 76
Nutt, B. W., 230
Nystagmus, miners', 126

O

Odorless gas, 33
Ohio accidents, industrial, 234
Oil burners, 155
Oil of Salt, 46, 303
Oil pollution of harbors, 292
Ontario Safety League, 294
  Motto, 105
Optical posters, 199
Optimist, 199
Orchestration of labor, 23
Orr Machine Guarding Co., 98
Osgood, T. W.
  A new punch press guard, 56
Overland Shoe Co., 95
Oxweld Acetylene Co., 49
Oyster purification, 291

P

Pacific Gas & Electric Co., 233
Paint, safety in frequent use, 125
Paint store explosion, 82
Painting, industrial, 65
Paintlight, 179
Panic exits, 79
Pawling & Harnischfeger Co., 146
Pay day and safety, 78
Payne, E. G., 36
Pennsylvania
  Film safety committee, 287
  Industrial Board rulings, 127
  Mine safety, 77
Pensions, industrial, 126
Personnel Research Federation, 185
Philadelphia
  Building problems discussed, 292
  Engineers' meeting, 72
  Fire works, 288
Phthisis, miners', 294
Physical examination, 195
Physician, staff, 297
Picric acid, 232
Pierce, Dana
  Safety in relation to electrical appliances, 206
Piling of material, unsafe, 66
Pilling, R. L., 78
Pittsburgh, elevator safety lock that failed, 77
Pittsburgh Screw & Bolt Co., 98

Plagiarism, 74
Platforms of brick, concrete and hollow tile, fire danger, 262
Pneumatic system of dust removal, 226
Poems of safety. *See* Verse
Port Jervis, 79
Porter, Ind., wreck, 103, 123
Porter, F. P., 90
Post-graduate work, 40
Presses, guards, 145, 251
Pressure gauge, 152
Price, D. J., 283
Prohibition, 236
Pulmosan Safety Equipment Co., 190
Pulmosan Sand Blast Helmet, 202
Pulpit, safety in, 67
Punch press guard, 56, 145, 251

R

Radiation, 257
Railroad ties, weather-proofed, 293
Railroads
  Cab lookout, 123
  Father of safety movement, 30
  Porter, Ind., wreck, 103, 123
  Safety record in the West, 76
  Signaling, engineering aspects, 277
  Trying to be safest, 37
Rand, C. F., 290
Rats, campaign against, 287
Reason, appeals to, 76
Red Cross First Aid course, 192
Rene, D. H., 78
Revere, Mass., fire, 124
Rice, C. G., 79
Richards, R. C., 30
Rispalje, P. O.
  "Mother Goose," etc. (verse), 140
Risteen, A. D., 285
Robinson, J. A., 67, 229, 237
  Fire protection of schoolhouses, 115
Robinson, W. C., on increasing fire hazard of dwellings, 178
Roofs, shingle, 124
Rosa, E. B., 287
Ross, L. F., 45
Ross Hydrant Thawing Device, 45
Rotary tube cleaners, 153
Rowe, F. H., 245
Rubber mill mixing molds, 289
Rubbish court, Denver, 291
Rudd, A. H.
  Engineering aspects of signaling, 277

S

Safeguarding, mechanical, 135
"Safeguarding America Against Fire," 255
Safety glass, 302
Safety
  Poems and songs, 140
  Thrift and, 34
Safety-Board Holder, 304
Safety boiler latch, 98
Safety bulletins. *See* Bulletins
Safety codes, 189
Safety consultant, 73
Safety education, 136, 242
Safety engineer, 11, 87
Safety fables in slang, 193
Safety First
  Cartoon, 122
  In the pulpit, 67
  In the schools, 138
Safety First Supply Co., 200
Safety fuses, 234
Safety lamps, 231
Safety mask, 235
Safety "movies" (ill.), 86
Safety news and comment, 30, 72, 125, 185, 230, 287
Safety Pin, The, 74
Safety salesman, 243
Safety saw guard, 147
Safety standard, making, 222
"Safety Steve," 297
Safety supervisors' school, 31
Safety supplies, new company, 131
Safety teaching, 40
Safety trophy, 73
Safety work
  Don't "let up," 123
  Education in, 136
St. John, Paul, 283
San Francisco, N. F. P. A. meeting, 125, 205, 224, 264
Sanford, G. E.
  Address, 85
  Competition as a factor in accident prevention, 284
  New president of A. S. S. E., 30
  Portrait, 1
Sanitation, 235
  Backwardness, 76
Sash chain, 253
Saw guard, 41, 147
Sayre, W. H., obituary, 35
"School, Drive Slow," 26
Schoolhouses, 82
  Fire protection, 115
  Norfolk fire, 182
  Safety to life, 72
Schools
  Firemen as teachers, 81
  Safety First in, 138
Scrapped containers, 233
Selle, Emma M., 26
Shifter, Kleckler Automatic, 143
Shingles for roofs, 124
Shipbuilding
  Accident prevention, 171
  Safety to life in, 108
Ships
  Construction and operation, 133
  Fire hazards, 159
  Safety to life in operation, 111
  See also Steamships
Shoes, aluminum, 95
Sickness, 235
Sidewalk sheds, 215
Signaling, railroad, 277
Signs, 252
Silicosis, 294
Simonds File Co., 73
Slang fables, 193
Slings, 173
Slipping, 183
Slipping of horses, 36
Sly (W. W.) Mfg. Co., 202
Sly dust arresters, 202
Smith, George Oliver, 38
  A new tubular breathing mask, 106
Smith & Egge Mfg. Co., 253
Smokestacks, protection, 259
Smoking, 44
Soderberg, G. J., 123
  Goggles for locomotive enginemen, 102
Solvay Life, 96
South Africa
  Mine injury rate, 263
  Safety exhibition, 288
Southard, E. E., 131
Sparks from locomotives, 81
Spence, P. C.
  Building construction and demolition accidents, 218
  On safer construction, 185
Springfield F. & M. Insurance Co., 95
Sprinkler tank installation, 73
Sprinklers, 8
  Apartment houses in Massachusetts, 224, 287
  Failures, 35
Stacey, A. E., 282
Stair treads, 249
Stairways, 87
Stairs, falls on (cartoon), 18
Standard Optical Co., 199
Standards
  Engineering, sketches, 236
  Making a safety standard, 222
"Star" ventilators, 98
Steam boilers, 150
Steam flow meter, 154
Steamships, safety methods in loading and unloading, 113

Steel building, removal, 57
Steel frame building wrecking methods, 167
Steel industry, safety work, etc., 58
Steel & Tube Co. of America, 235
Stewart, F. J. T.
Dissecting a 29-year-old steel skeleton building, 57
Stier's Automatic Guard, 251
Stonehouse Steel Sign Co., 46, 252
Stoves, overheated, 2
Stroh, Ind., 78
Swartz, Nelle
Accidents among women in industry 19

T

Tank cars
Explosion at Memphis, 101, 127
Teaching safety, 40
Terra cotta, 72
Theaters
Audiences in case of fire, 286
Exits, 79
Women ushers, 225
Thrift, 34
Thunderstorm safe-conduct measures, 292
Tile, hollow, 231
Tin ceilings, 4
Tire tube explosion, 79
"Tisco," 131, 190, 251
Circulars, 203
Titsworth, F. S.
Marine fire hazard statistics, 159
Tobacco, 44
Tolman, C. P.
Engineering revision—the engineer's part in safety, 279
Tolsted, E. B., 126
Toonerville fire dept., 82
Towels, bald dentist's, 117
Traction accidents in Greater New York, 132
Traffic control, 127
Tripping, 183
Trolley safety cut-out for miner, 281
Trucks, 241
Trumbull Meter Service Switches, 304
Tunnels, vehicular, ventilation, 125

U

Ulivi, Giulio, 179
Underhill, A. M., 139
Underwriters' Laboratories, 31
Devices listed, 49, 99, 148, 204, 253, 306
On fire tests of columns, 64
Organization, scope and service, 212
Unions, right to take chances, 36
U. S. Steel Corporation, expenditures for safety, sanitation, pensions and welfare, 58
Untermyer, Samuel, 276
Upper Sandusky, 82
Usherettes in theaters, 225
Utah miners, 78

V

Vacuum cleaners, 227
Valves, 150
Non-return, 153
Vehicular tunnel ventilation, 125
Ventilation, 98
As factor in fires, 261
Classroom methods, 274
Coal and metal mines, 130
Heating and ventilating shows, 231
Vehicular tunnel, 125
Vermin, 5
Verse
"Breathes there a man," 25
Catastrophe, 33
MacAndrews' hymn, 24
"Mother Goose," etc., 140
Plagiarized, 74
Safety First, 140
Warning cry of caution, 140
Vertico-Slant drinking fountain nozzle, 199
Vigilance committee for autoists, 79
Viking fire protection equipment, 252
Vogel (H. G.) Co., 97
Volk, A. A., 191
On historical wreckers, 178
Structural demolition, 180

W

Wabash Portland Cement Plant, 78
Walsh, J. J.
Rules for prevention of gas explosions in anthracite mines, 69
Walsh, T. A.
Accident prevention in shipbuilding, 171
Warren, F. D., 90
Washington (State), coal mining accidents, 62
Washington, D. C., census records burned, 39
Waste in industry, eliminating, 129, 234
Weigley, H. C.
Training of private fire brigades, 52
Welch, W. E., 191
Safety methods in loading and unloading steamships, 113
Wrecking of steel frame buildings, 167
West Everett, Mass., 284
West Virginia, mine safety, 76
Westinghouse E. & M. Co., 305
Westinghouse Lamp Co., 251
Whitcomb (Geo. D.) Co., 130
Wiesman Safety Guard, 145
Williams, S. J., 279
Willson, Dr. Frederick, 127
Willson Goggles, 201
Industrial poem and cartoon, 25
Wind River Lumber Co., 36
Wisconsin
Acetylene disasters, 129
Acetylene plants, 188
Dealing with violators of safety laws, 74
Wisconsin Safety Review, 80
Wittmaak, H. S., 74
Women in industry, accidents, 19
Wooden machine guards, 176
Woodwork, exposed, hazard, 256
Words, 23
Workmen's safety committees, 88
World Chamber of Commerce, 287
Worthington, C. E.
Ignitions of combustible materials, especially exposed woodwork, by heat-producing apparatus, 256
New housing should not be built to burn, 2
Wreckers, historical, 178
Wrecking methods, 167
Pictorial, 180
Wrench, IXL, 200

X

X-rays, 82

Y

Yawman & Erbe, 302
Yeager, John, 81
Young, C. N., 35, 240
Youth's Companion, 37

Z

Zinc chloride, 293

Safety Engineering

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G. E. SANFORD

Newly Elected President, American Society of Safety Engineers

See page 30.

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3,000,000 New Buildings for Housing Purposes Are Called for in the Year 1921

They Should Not Be Built to Burn—Some Common-Sense Precautions that Will Reduce Fire Hazards

By C. E. Worthington
Wellesley Hills, Mass.

HOUSING is expected to be provided during 1921 for about 5,000,000 families. That the new structures designed for single dwelling occupancies and small tenements for three families or fewer will call for about 3,000,000 buildings, with an average cost per house of $4,000, or a total cost of $12,000,000,000, is a conservative estimate. These new homes will suffer loss by fire to the probable extent of about $18,000,000, of which fully one-third, or $6,000,000, will be due to defective construction of chimneys or ignitions near chimneys or due to radiated heat from stoves or stove pipes.

Six million dollars is a good bit of money from the viewpoint of the average citizen whose pro-rata share of the National wealth is about $3,000. It would require a contribution of the pro-rata shares of 2,000 of them to make up the sum. It is 6 per cent interest on $100,000,000, and represents the entire yearly earnings of 3,000 well-to-do mechanics or tradesmen; and yet this is only the share of the great total annual fire waste that is to be allotted to one year's construction, *due to one single group of nearly preventable causes!*

And when this is multiplied by the number of existing dwellings the figures of the total annual sacrifice become impressive, even formidable; nor is it an overestimate. The United States Railway Association, listing one year's fires in its property, attributes nearly 50 per cent (224 out of 527) to "overheated stoves and pipes," with more than 20 per cent of the total fire loss from these two origins alone; a proportion which, if carried out, would bring the loss annually in the United States and Canada to about $50,000,000, a figure which is probably not far from correct.

This loss and the loss from defective chimneys are calamities almost completely avoidable by proper measures of prevention at the outset.

FIRES CAUSED BY OVERHEATED STOVES AND PIPES

In nearly every instance of fires attributed to "overheated stoves" the origin is in woodwork exposed to heat radiation from the stove or communicated to the woodwork by ignition of combustible material between the stove and wall by radiation or contact. The underlying fault is in having any woodwork there to ignite, which means both under the plaster and studding as well as wainscotting or other trim.

If you are about to build a house see to it that the specifications call for three things, viz.:

1. Construction of the wall or partition back of stove or range 5 or 6 ft. in width by the same in height, of partition tile or brick, plastering directly upon this,

using light metal lath, if desired, and omitting the studding for that space.

2. Do not put a wooden wainscot on the wall within 5 ft. of stove or range. It may at first appear to be some sacrifice of taste in ornamentation to omit the wainscot on a part of a kitchen, for instance, but no wainscot at all is more sightly than one covered with metal or one marred and blistered by heat; besides, it is better to avoid entirely a recognized hazard than to go to some expense to create it, and then to some more expense in an effort to modify it.

Wooden wainscot can be replaced, if desired, for this space by metal so painted as to be practically indistinguishable from wood, but this is an expense, although not a large one.

3. Under the range or stove or at the point where the stove is to stand omit the top flooring and lay a platform of granolithic concrete 2 in. thick, with thin sheet metal between it and the under layer of floor and a light wire reinforcement in the slab, which will stand about 1 in. or 1⅛ in. above the floor. This should be a little larger than the area of the stove and extend out on the firing side 12 to 18 in.

Ordinarily, these requirements embodied in the contract and specifications will not serve to increase the total cost, or at most will make but a nominal increase, and will provide almost immunity from this class of accident.

Occasionally it may be impracticable to construct a part of the wall or partition wholly of brick or tile, in which event the spaces between the studding for the prescribed area may be filled in solid with brick tile or cement concrete and plastered on expanded metal.

The time to lock the stable door is before the horse is stolen. See that all of this goes into the specifications and the specifications are observed.

Of course, it can be done afterward, but that means expense and the added cost of tearing out something already in. Alterations are unsatisfactory. Original precautions cost practically nothing and are permanently effective. Nothing that is externally discernible in the finish is suggested other than the omission, in some cases, of wooden wainscot.

CHIMNEYS

The chimney specifications of the National Board of Fire Underwriters are a safe guide and should be followed irrespective of local legislation. These specifications were prepared with much care by eminent and competent experts, and will not in any case be likely to conflict with local legislation by way of omission of any safety requirements, although frequently exceeding the requirements of such laws.

It should be urged, however, that, properly finished on the brick, chimneys may as a rule be carried up entirely exposed and not anywhere enclosed by furring and lath and plaster.

In nearly every case, even in rooms where wall paper is contemplated, this can be done without detriment to the appearance of the room and with some economy of space otherwise occupied by the frame and sheathing; in fact, it has been done in a number of fairly expensive houses with a result that cannot be termed otherwise than pleasing.

A careful examination of chimneys of several years' standing will serve to convince of the difficulty, if not impossibility, of making the surrounding frame follow the lines of shrinkage and settlement to the extent of avoiding ultimate contacts of framework and chimney; nor is there any permanent scheme for protecting the space beneath lath, plaster and chimney except by recessing the finish about the funnel tubes, which is considered to a large extent as unsightly.

As a matter of fact, chimney defects are to a very large extent developed long after construction and escape attention because of concealment, defects in the main either harmless except because of the enclosure or such as would be quickly recognized and corrected in an exposed chimney.

A really competent architect will be able, as a rule, to adapt this method in a way to satisfy the most exacting taste and can almost invariably provide a means of examining the chimney between the upper ceiling and the roof, the point where the greatest number of defects occur and the most dangerous.

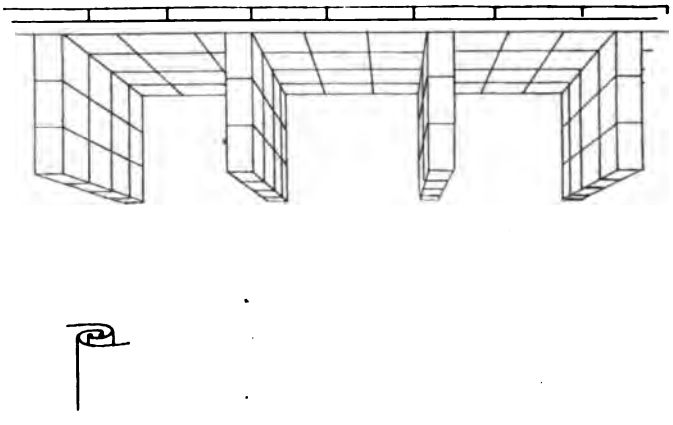
The precise method of applying a permanent satisfactory finish is, of course,

of importance, and if desired SAFETY ENGINEERING will furnish a formula for such finish whenever asked for, which, in the hands of one extensive builder, has been found completely satisfactory.

SPECIFICATIONS

Remember that the mass of detail to be encountered in planning a dwelling of modern type is almost bewildering, and architects and their assistants are by no means inexcusable for making some omissions; hence, it is important that all plans and specifications be carefully scrutinized before contracts are let, in the effort to discover and correct such omissions.

Custom has favored sheathed chimneys and the fire hazards of ordinary dwelling construction have been largely disregarded, even to the extent that discussion of these finds little place in architectural books.



The Correct Way to Apply Tin to a Ceiling

Popular taste may be said to have been very largely created by the architectural profession, and subject by this same process to re-creation to a large extent, it is not difficult to eliminate the concealed space about chimneys.

FURNACES AND BOILERS

It is not usually practicable or economical to construct a cellar or basement in a dwelling (urban "high basement houses" excepted), especially in detached or semi-detached houses, where there is a safe clearance to floor joists above.

Local legislation frequently exacts special protection at this point to the "satisfaction of the inspector," some inspectors being more easily "satisfied" than others.

Without going into long explanation as to the "why" it may be dogmatically stated thus:

The best method of protection of such ceilings will usually be realized in sheathing the joints and under side of floor above with bright roofing tin, laying it with "lock joints" to conform strictly to the surfaces, up and *between* joists, not *across* them, carefully avoiding air spaces between tin and wood and securing as close a fit as possible.

Asbestos mill-board or compressed cement-board with asbestos binder may be used in place of tin, if joints are closely butted and cemented and not less than ⅛ in. thickness is used. The disposition of screws or nails with exposed heads to draw out under continued heat impairs this latter method.

If plaster or expanded metal, underhung or screwed directly to and across joists, is used, care should be taken to stop off the channels between joists where the ceiling ends, using strong wire net with a close mesh—say 1/16 in. The reason is obvious.

It is needless to say that this should be done before the heating apparatus is set up.

Where the smoke pipes, as they often must, enter chimneys within 18 in. of ceiling, it is preferable to cover the upper half of pipe (saddle) with an inch or more of some effective and durable insulator. This costs less and is much more effective than any attempt at protecting the ceiling directly. Protection, as a rule, is the more effective the nearer it can be applied to the source of radiation.

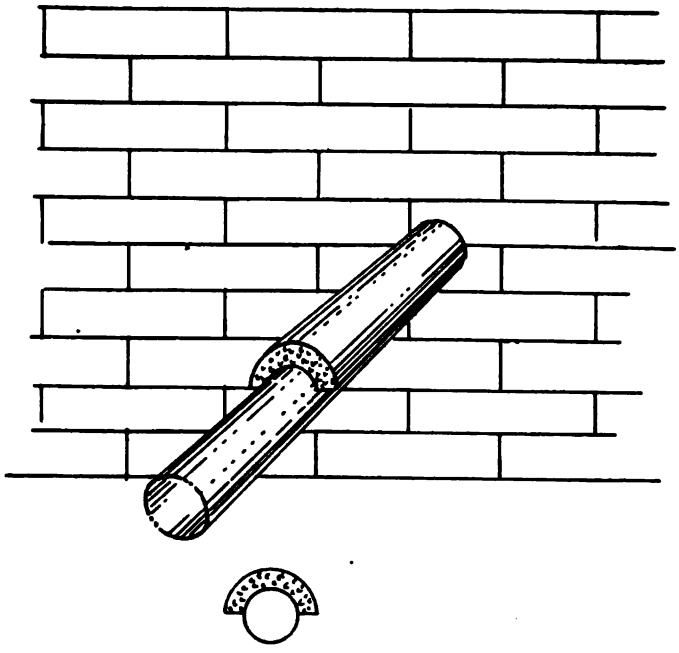
Do not rely upon the ordinary thin asbestos paper with clay binder. This possesses practically no insulating quality

and is perishable, disintegrating rapidly with dampness and a little less rapidly under continued heat. Neither use any form of insulator composed wholly or in part of animal or vegetable matter, such as hair, wool or the like, either on furnace or steam pipes of any description or pressure. They all are combustible and their combustibility increases with exposure, even to moderate heat, actual spontaneous ignition very often preceding dissolution.

Cellular asbestos is an effective insulator of ¾ in. thick or more, likewise magnesia and similar mineral compounds and cements.

These are incontrovertible insulation facts and may be accepted fully, no matter how eloquently the salesman may urge the use of hair, wool or similar insulators. All such should be rejected on all warm or hot pipes, inclusive of the tin hot-air conductors. Insulation of the tin pipes is better if carried through floors and up to contact with the soapstone collar. Steam and hot water pipes passing through floors are better "bushed" completely throughout the concealed spaces, not especially because of any direct fire menace in the pressures usual to dwellings but for other reasons which tend to make such bushing desirable.

The "overheated" stove, furnace or pipe is merely a fiction designed to relieve or shift responsibility. No apparatus of this class can be actually overheated unless heated to the point where it collapses structurally or suffers such change of form as to render it unfit for further use for the purpose for which it was designed by reason of excessive heating. The real fault lies in failure to provide proper safeguards against the effects of maximum legitimate heating and the physical changes due to long exposure of combustible material to heat, even though intermittent.



Cross Section of Insulation

Saddle Insulation for Smoke-Pipe

FIRE AND VERMIN STOPS

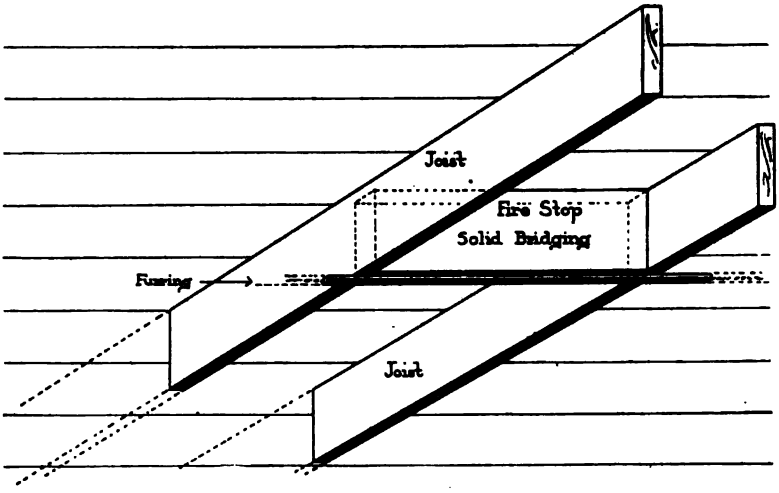
Wherever a building law is in force it will provide for fire stops at each floor. This is good as far as it goes, but the value and effectiveness of fire stops is not in anywise dependent upon the adoption of a building law or in consequence of such adoption.

It is incumbent, therefore, upon architect, contractor and owner to make sure that such fire stops are specified and included, whether such inclusion is compulsory or otherwise. In general, it will be sufficient to call for this "in conformity with the best prevailing practice where such are legally required." It can hardly be claimed that this does not add something to the construction cost, but the value as to protection of property and life far exceeds the added outlay.

It is suggested also that utilizing joist ends to form solid stops in the channels

of floor joists and between studs, so far as it can be done and preserve the necessary passages for piping and wiring, is of material value as fire and vermin protection and would probably add nothing but the majority of channels can.

In all of these suggestions there is but one thought—an ounce of prevention is in the end worth much more than the services of the fire department, and every



Solid Bridging

to construction cost, or at most a negligible increment. Presumably, all channels could not be so stopped without inconvenience or any considerable expense, means of preventing or retarding fire that can be applied at time of construction with a minimum of cost and trouble is worth very careful consideration.

15,219 Fire Casualties in 1920

By T. Alfred Fleming

Supervisor, Conservation Department, National Board of Fire Underwriters

Proceedings of Joint Meeting of the American Society of Safety Engineers and the New York Chapter of the National Fire Protection Association

THE loss by fire on buildings insured and uninsured with the addition of the forestry loss and the upkeep of the fire departments and water supply necessary for extinguishment, in 1919, cost our citizens over $2,000,000 a day.

The people pay the whole cost. Insurance companies are but collecting and distributing agencies. Citizens pay the losses either in the actual premium or the price of the goods they buy.

In 1919, the casualties reached the enormous total of 15,219 killed and 17,641 injured, many of them permanently.

Eighty-two per cent of this number were mothers and children under school age.

Over sixty per cent of the total number of fires occur in dwellings. The hazards of the home have been seriously augmented by the introduction of new labor saving devices without proper advice as to their use and attendant hazards.

Over ninety per cent of the school buildings of the United States are in more dangerous condition than was the Collinwood school before it burned, caus-

ing the death of 173 children and 3 teachers.

Personal responsibility for physical protection from fire is the duty of every member of every board of education in the country. Only one school official out of 100 assumes this duty. For example, an inspector found that a school board had installed a gasoline engine in the basement of a fourteen-room school for power purposes, and had over sixty gallons of gasoline stored in cans within ten feet of the engine. One gallon of gasoline in explosive effect is equal to 83 2/3 pounds of dynamite.

There are over 25,000,000 people in the United States living in temporary quarters. About 1,500,000 immigrants have entered the country in 1920. 10,000,000 are waiting to come as soon as the war barrier is lifted. If 5,000,000 homes were built this week, it would not be sufficient, yet we are burning 898 homes every working day.

Shall we not attempt to curb this dreadful leakage of life and property?

Protecting Life by Automatic Control of Fire

By Henry A. Fiske

Member of the National Fire Protection Association and One of the Pioneer Fire Prevention Engineers of the United States

Proceedings of Joint Meeting of the American Society of Safety Engineers and the New York Chapter of the National Fire Protection Association, December 17

IS it feasible to provide safety from fire inside buildings? Most of the loss of life in buildings is due to fire spreading too rapidly for the inmates to escape, and this rapid spread is generally due to unsafe conditions, such as poor construction, floor openings, hazardous contents and congestion.

Unsafe conditions is a purely relative term, and when applied to construction we have in mind, perhaps, that the average type of building, with brick walls, wooden floors, protected floor openings and fire escapes, is relatively safe.

Experience has shown, however, that buildings of much better than average construction were not safe, and it is a fair statement that construction alone cannot accomplish even reasonable safety, unless we limit area, height and character of contents.

The more one studies the subject of safety to life from the standpoint of construction alone, the more one is convinced that the problem of safety is only partly solved by superior construction. Similarly, the question of exits is only a part of the problem, and, no matter how carefully worked out, may fail in its results if other conditions are unsatisfactory.

We have been educating the public along rather illogical lines; first, that buildings should be non-burnable; and, second, that even if non-burnable, the only safe place is outside. Furthermore, this leads to a very unsatisfactory state of mind on the part of the property owner. If he has a building which complies with the average conditions of safety as to construction and provides reasonable means for the people to get out, he has done all that is required and his conscience is free and clear.

If there was no other solution than improvements in construction, exits and manually operated fire extinguishing devices, we could work out these features to the greatest possible refinement, consider our work completed and then say to the person who finds it necessary to go into such buildings: "We have fixed things as safe as we know how, but if there is a fire you had better get out of the building as soon as possible by means of the exits which we have provided."

There is a far better solution and infinitely more simple.

Owing to the fact that most of our buildings are unsafe, or at least could be improved in important respects, the problem of making most buildings even reasonably safe would be a hopeless task, because of its complexity, if for no other reason, if it were not for the fact that automatic protection is available, and adaptable to all buildings.

The automatic sprinkler system offers a complete and satisfactory answer to our problem of safety to life in buildings. In a building protected with sprinklers we no longer need to tell the occupants that the only safe place is outside. They can know that they are safe inside, for the fire will be controlled in its incipiency. We no longer need to make many of the changes in construction and protection which would otherwise be necessary. A building equipped with sprinklers becomes a fire-safe building.

PRESENT UNSAFE CONDITIONS

To illustrate the need for safety from fire, I will attempt to paint a graphic picture of the present unsafe conditions.

It is estimated that the present loss of human life by fire in this country is from 10,000 to 15,000 persons a year and 250,000 in the past 40 years. For this same period property values to the extent of $7,000,000,000 have been consumed.

There is a long list of holocausts, just a few of which I will recall: Triangle Waist Co., in a so-called "fireproof" building, 150 lives lost; Binghamton Clothing Co., an average brick factory, 31 lives; Newark factory, paper box and other manufacturing, 25 lives; Brown Building, Pittsburgh, brick, 13 lives; Granite Mills, stone cotton mill, 23 lives; Iroquois Theater, so-called "fireproof," 600 lives; Brooklyn Theater, 297 lives; Royal Theater, Quebec, 47 lives; Collinwood (Ohio) School, 176 lives; Peabody (Mass.) School, 21 lives; Oklahoma State Hospital, 38 lives; Montreal Hospital, 100 lives; Quebec Hospital, 27 lives; Missouri Athletic Club, 35 lives; Hotel Arcadia, Boston, 28 lives; Windsor Hotel, New York, 50 lives.

Those who know the conditions existing throughout this country cannot but wonder that the loss of life is not even greater. Criminal seems a mild word when we find, as I have, a number of men and girls in the upper floor of a 4-story wooden factory building, of the flimsiest construction with open stairs and elevators and a wooden ladder nailed on the outside of the building for a fire escape.

We permit conditions in our factories, stores, schools, institutions and other buildings that should not be tolerated, and one reason they are tolerated is the general impression that it is difficult and complicated to make them safe. If the public only realized how simple is the answer, its opinion would influence property owners to provide for automatic control of fire.

WORK OF AUTOMATIC SPRINKLERS

Now let us look at the other picture —of what has been accomplished by automatic sprinklers in protecting life from fire.

My guess is, perhaps, as good as another, and an estimate of 40,000 properties in this country equipped with sprinklers is probably conservative. It is likely that there are 20,000,000 persons daily under the protection of automatic sprinklers. Sprinklers have been in use for about 40 years, and during this period the average number of persons in sprinkler protected buildings has been at least 5,000,000 daily.

During the 40-year period there have been perhaps 50 lives lost by fire in properties protected by sprinklers, excluding explosions which wrecked buildings. Of this small number I do not know of a single case where life would have been saved by any improvements or regulations relating to construction or protection. In these instances life was lost chiefly because the fire was so quick that clothing became ignited before the person could escape; in other words, the accident was local and the person injured or killed because of immediate proximity to the fire.

In all these years, with these millions of persons congregated in buildings of all kinds of construction, and used for

all kinds of purposes, the automatic sprinkler has a perfect score in safeguarding life. It has accomplished precisely what it is designed to accomplish, and that is, to give the maximum measure of safety to the occupants of a building. It is true that buildings have burned which were equipped with sprinklers; therefore, it may be argued that loss of life might have occurred under such conditions. The sprinkler system may be entirely out of commission. We cannot avoid the human element entirely. We can only do what is reasonable in safeguarding any property. The chance of a serious fire in a sprinklered building is so small that in all these years it has failed to happen under conditions which resulted in loss of life.

During the past 40 years there have been more than 40,000 fires controlled by sprinklers, which probably represent an economic saving of fully $3,000,000,000. To this we may add another $1,000,000,000 as an estimate of the probable value of human lives saved to society.

More than 10 fires a day are controlled by automatic sprinklers in this country. Many of these fires occur under conditions which endanger life, and yet the slate remains clean. Against this is the almost daily occurrence of loss of life in properties not so protected.

The record of fires in sprinklered properties shows clearly the remarkable results obtained. I have combined the figures for the classes of property where great numbers of persons are employed or congregate, and they show that 98.2% of all the fires have been extinguished or controlled by sprinklers—almost a perfect record.

Let us have laws covering construction, exits and similar features. They are necessary and proper. But the practical solution of present unsafe conditions will not be found in such measures, for we cannot rebuild our many flimsy buildings. We must find a remedy which is both simple and commercially feasible.

A GOOD INVESTMENT

Just a word about the properties where the danger to life is perhaps greatest and where automatic sprinklers have not been installed to any great extent because of the relatively small property value as compared to factories and stores.

A very large percentage of all properties now equipped with sprinklers have been so equipped because of the material saving in insurance premiums, and in some cases this saving runs as high as 90%. Which means that it is a good investment to install sprinklers regardless of their value as a protection to life and property.

However, with such classes of property as dwellings, apartments, hotels, schools, colleges, institutions, office and public buildings, the saving in insurance is much less because of the relatively small property value. Moreover, the insurance rates on these properties without sprinklers are lower.

The need of safeguarding life in these classes of properties is most important.

An investigation was made recently of the fire reports of the N. F. P. A. to determine where fires start in schools, colleges, institutions and hotels. This brought out the fact that about 60% of the fires in these classes started in basements or working portions. As fires that start in these locations, particularly at night, are likely to spread and become dangerous, it would appear that sprinklers installed throughout these portions would reduce very materially the danger to life. If we would also equip the halls, storerooms, stairways, elevators and other floor openings, the danger would be still further reduced.

In my opinion, the application of automatic sprinklers to classes of property where safety to life is the chief need has only just started.

Experience has demonstrated beyond doubt that the automatic sprinkler system is the only feasible means of providing safety from fire inside buildings.

America's Challenge: Loss of Life from Fire and Safety Activities of the Past

By H. Walter Forster

Vice-President, Independence Bureau, Philadelphia

Proceedings of Joint Meeting of the American Society of Safety Engineers and the New York Chapter of the National Fire Protection Association

THE annual loss by fire of from 10,000 to 15,000 men, women and children, the most precious asset of the Nation, is the fundamental reason for the interest of the American Society of Safety Engineers and many other organizations in fire prevention and fire protection. While the loss of property, some $300,000,000 a year, is in itself a tremendous incentive to cutting down the fire waste, the certainty that a large part of the life loss can be prevented gives the subject its powerful appeal.

To us as engineers interested in safety in its various aspects such a serious economic loss, coupled with known ability to prevent a large portion thereof, constitutes a definite challenge. I believe that the organizations here represented will not ignore this challenge.

Fires in habitations of various kinds make up the bulk of the life loss. There is nothing particularly spectacular about these incidents; they get, on the whole, relatively little publicity; but they strike at the base of our social structure, the home. When one considers the terror and agony of the person who loses his life, and the horror and grief of those who remain behind in even a single case, and then multiplies this by literally thousands of incidents each year, and year after year, one can get some idea of the horrible indictment of our American conditions which our life loss by fire constitutes.

Our school disasters annually account for a considerable number of children and for some adults; fires in hospitals and asylums exact life toll; occasionally a hotel or a factory disaster adds to the quota; at intervals a theater horror shocks the Nation, and at rare intervals a steamship horror adds a large number to the lives lost by fire in a given year.

I think that it is no exaggeration to state that these conditions are a definite challenge to our humanity and to our professional skill.

Others tonight are going to discuss various phases of the problem of preventing life and property loss by fire. I shall devote my remarks to certain general statements which perhaps will establish a common basis for our considerations.

Life loss results primarily from the following reasons:

1. Fire breaking out. Obviously, no matter how dangerous the conditions, unless fire occurs there is no jeopardy to life from fire. Hence, the first and most important problem by which a man who would safeguard life is confronted is to eliminate the possible causes of fire.

2. Fire spread with sufficient speed to jeopardize life. Here the question of the construction, of area, of the protection of exits, of the cutting off of means by which fire can spread rapidly vertically, and allied problems present themselves. Closed doors caused the Collingwood disaster, for had the doors been open the fire probably would not have caused any appreciable life loss.

3. Lack of means for detecting and announcing fire. Reporting to department has a definite bearing upon the saving of life, but generally the spread of fire causes life loss so quickly that the problem of notification is one of giving the alarm in the structure where the fire breaks out rather than calling outside help. The automatic fire alarm is a practical commercial device and it can be used in various types of structures from the dwelling house upwards.

4. Providing for extinguishment of fire. Here the automatic sprinkler is of paramount importance. Other means of extinguishing fires are vitally important,

for most fires are discovered in the incipient stage and can be extinguished without much difficulty. The use of a dry product tube on burning scenery in the Iroquois Theater is believed to be responsible for the loss of 600 lives. A soda-acid extinguisher conveniently at hand probably would have prevented that holocaust.

No doubt these general principles apply to virtually every building or structure in which life is exposed to fire jeopardy. The problem of how to apply these principles is, of course, a difficult one. In connection with manufacturing plants, public buildings, hotels and other important structures, it is very simple to get at the fundamentals of the situation through efficient inspection service, and it is practical for the law to step in and make requirements for construction, protection and upkeep. But the big problem if life loss is to be reduced is the individual and multiple dwelling, and here, in so far as I know, the law has never made any attempt whatsoever to enforce reasonable safeguards.

There is no reason why such fundamentals should not be required of the man who owns or occupies any form of dwellings. Inadequate exits, unsafe heating apparatus, bad housekeeping are quite as reprehensible in a single family dwelling as in a large factory building, particularly as a large part of the life loss in dwellings results from fires during the night, and this hazard falls away in virtually all industrial plants and places of public assembly.

Particularly important, however, is it that there be systematic, continuous, educational activity to drive home to the people of the country the vital importance of care against fire dangers. The schools are particularly fertile fields for work, for here it is possible to get at our future citizens, and a truly worth while campaign over a part of one generation will mean a far safer America within a decade or two to come.

The Principles of Efficiency and the Safety Engineer

By Edward Campbell, M. E.

IT has been said that to be a safety engineer all that a man required was the "gift of the gab and the eye of an eagle." In years gone by this may have been true, but today, however useful those gifts may be, several other qualifications are required.

In attempting an enumeration of the necessary qualities, the mind turns insensibly but irresistibly to the so-called 12 principles of efficiency, ably set forth by Harrington Emerson, which apply quite as well to safety engineering as to any other line of human endeavor.

Taking these in order, we consider:

1. *Definite Plans and Ideals.*

In other words, the effort to attain 100 per cent safety, and the best methods of applying that effort. Every safety campaign is based upon proper organization, which includes putting the plant in good physical condition by careful planning; maintaining this condition thereafter by thorough inspection, and the solution of the problem of the human element by a system of education of the employes into the spirit of safety, largely through the work of the foremen, upon whom depends, in the last analysis, the relative success attained.

2. *Common Sense.*

This, sometimes referred to as horse sense, is a quality the lack of which is the cause of a large proportion of all accidents. Another name for lack of common sense is carelessness, and in the accident records this cause leads all others on the black list. Common sense is essential in the designing of safeguards. Any machine can be made safe if a wall be built around it of sufficient height, but production would be nil.

It is related that a rural member of a State Legislature, some years ago, alarmed at the frequency of electrical accidents due to live wires, introduced a bill requiring all trolley wires to be heavily insulated! The story may not be true, but it illustrates a tendency sometimes noted in efforts at safety work.

3. *Competent Counsel.*

This implies careful and constant study, on the part of those in charge of safety matters, of all occupational hazards, and a knowledge of what has been and is being done by others along similar lines. In short, it means real prevention work, not curing by locking the stable door after the horse has gone.

4. *Discipline.*

This is a most difficult problem, since, while discipline must be maintained, it is important not to antagonize the management by discharging otherwise valuable employes for acts of carelessness which may injure themselves or endanger others. Getting rid of such an employe is merely "passing the buck" to the next factory where he seeks employment, whereas by proper instruction he might be led to abandon such careless or dangerous practices. A clear explanation of the benefits of, and necessity for, safety regulations makes their enforcement less difficult, for, as L. R. Palmer of the Equitable Life Assurance Society has said, "It is far easier to get people to do things because they want to, than because they have to." A rule not worth explaining is not worth enforcing.

5. *The Fair Deal.*

In safety work this simply means playing no favorites; deciding things on their merits, and not on the basis of personal prejudice. No campaign can have the hearty co-operation of the working-force unless a square deal is assured at all times.

6. *Reliable, Immediate and Adequate Records.*

Complete records of all accidents, embodying all factors, are as necessary for guidance in the battle against injury and death, which is being waged by the safety engineer, as are maps and other military intelligence to the general on the field of battle. Without them he is fighting in the dark against an unseen enemy of unknown strength and position, and he has no way of knowing whether he is gaining or losing in the fight.

7. *The Despatching of Work.*

Briefly, this means, "Do it now." If an accident has not been prevented, the least that can be done is to take steps without delay to prevent its recurrence. It is also advisable to follow up orders for the correction of hazardous conditions by prompt and careful inspection, to make sure that the work is done properly and without delay.

8. *Standards and Schedules.*

9. *Standardized Conditions.*

These two objects are best attained by following out the rules and recommendations of the various insurance carriers, safety councils and state labor departments, which have been based on the experience of large numbers of plants in all lines of industry and under all climatic and other conditions, and which represent the consensus of opinion of the best-trained engineers, regarding the most efficient preventive measures.

10. *Standardized Operations.*

11. *Written Standard Practice Instructions.*

These two principles deal with a matter that can only be touched on lightly by the safety engineer, as it is largely a function of the foreman, and as the latter's fullest co-operation is absolutely essential to success, we must be careful not to "tread on his toes." At the same time, the tactful safety man can accomplish a great deal toward the adoption of safe standards of operation, without impairing production.

12. *Efficiency Rewards.*

Theoretically, it should not be necessary to offer any reward for the improvement of safety conditions. Safety, like virtue, should be its own reward. But in practice it has been found that a system which awards prizes of one kind or another for the best suggestions for safety and the greatest improvement in percentage of accidents is most helpful in arousing the individual interest of the employes and inspiring the spirit of team work without which no safety campaign can succeed.

Industrial Lighting Equipment and Its Maintenance

By Samuel G. Hibben

Illuminating Engineer, The Westinghouse Lamp Company

Proceedings of the American Society of Safety Engineers

IN discussing industrial lighting fixture equipment, and particularly its maintenance, we have entered upon an argument disclosing much that is vital in the accomplishment of all three of the desiderata of successful industrial operation, viz.: production, speed and safety. And since production depends upon the other two, or since all three are really synonymous, any arguments applying to the maintenance of a grade of illumination satisfactory for safety will apply equally well to the others.

On account of the breadth of this subject we shall not attempt to describe the various types of lighting fixtures on the market, nor indicate of what a satisfactory lighting installation consists. One may say in general that good or bad lighting depends upon two outstanding factors. Bare incandescent lamps, or unshielded glaring illuminants that not only do not illuminate but cause a contraction of the pupilary opening of the eye and resultant decrease in seeing ability, form one of these factors. More or larger bare lamps only aggravate this trouble and increase the hazard. The solution is found in the proper use of a good reflector, or a shielding fixture.

INSUFFICIENT ILLUMINATION

The second factor is the matter of insufficient light, and this is very largely influenced by lamp renewals, reflector and lamp cleaning and the colors of surroundings or whatever would be involved in maintaining the original installation up to its initial efficiency. It is this very important phase of illuminating engineering that will be discussed in this paper.

Insufficient illumination unquestionably reduces visual acuity, decreases the speed of muscular action, confuses the mind and leads to accidents. A few figures will illustrate this point.

In the coal industry, for example, we think of coal mine accidents as resulting mostly from falling slate or gas explosions, whereas statistics show that out of each 1,000 men employed underground there are 11 serious or fatal accidents a year, and out of the same number of employes working above ground there are 5 serious accidents per year. In very few industries is the illumination so wretched, either above or below ground, and this largely explains why we find the abnormally high accident rate in both places. The five accidents that occur uninfluenced by underground hazards can be almost altogether attributed to either poor natural or poor artificial light, and doubtless more than one-third of the underground accidents arise from the same or a greater insufficiency of light.

Granting, for a moment, that good illumination is largely dependent upon the care of the lighting equipment, let us see what valuation may be put on poor maintenance; in other words, what is the high cost of poor light. Figures that in general agree with insurance statistics (if they err it is upon the safe side) show that the total annual serious accidents in industrial plants in the United States amount to 25,000 per year. That is the minimum figure. Out of this 25,000 we find 15% chargeable to poor illumination—either unshielded poorly directed light or insufficient light. Now, based upon the average amount of employes' compensations paid, the equivalent lost time of each serious or fatal accident traceable to faulty illumination is 850 weeks, or the total annual time lost is over 3,000,000 weeks, roughly equivalent to the working life

times of 1,000 men. If these men were earning $25 per week, then practically $80,000,000 in wages are lost annually through improper lighting. If we add to this staggering sum the doctors' bills, medicines and losses of production we arrive at astonishing figures.

ARTIFICIAL AND DAYLIGHT INTENSITIES

One does not often think about the fact that the intensities of artificial light in factories are much below the daylight intensities, as illustrated in Fig. 1. We find daylight in factories running from

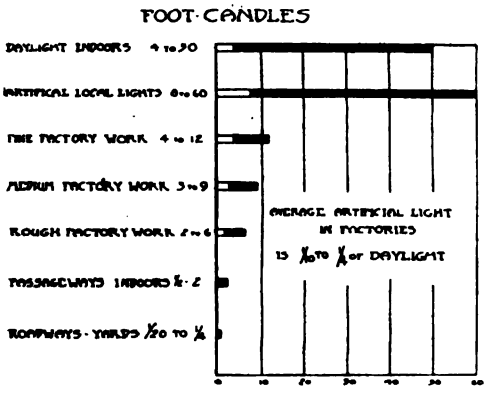
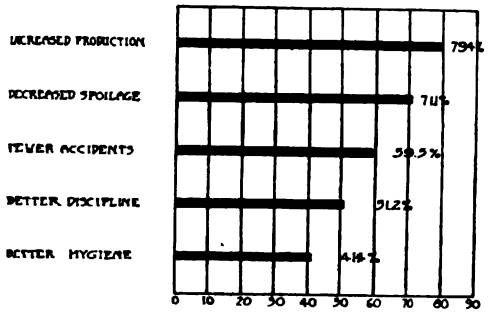

FOOT-CANDLES
DAYLIGHT INDOORS 4 to 50
ARTIFICIAL LOCAL LIGHTS 0 to 60
FINE FACTORY WORK 4 to 12
MEDIUM FACTORY WORK 3 to 9
ROUGH FACTORY WORK 2 to 6
PASSAGEWAYS INDOORS ½ - 2
ROADWAYS - YARDS 1/20 to ¼
AVERAGE ARTIFICIAL LIGHT IN FACTORIES
15 1/10 TO ¼ OF DAYLIGHT

Fig. 1

4 to approximately 50 foot-candles; general artificial lighting in factories for even fine factory work has this year been in the range of 4 to 12; medium factory work between 3 and 9, and sometimes down to ½ or ¼ foot-candles for indoor passageways. Places like stairways and the positions where accidents


INCREASED PRODUCTION 79%
DECREASED SPOILAGE 71%
FEWER ACCIDENTS 59.5%
BETTER DISCIPLINE 51.2%
BETTER HYGIENE 41.8%
0 10 20 30 40 50 60 70 80 90

HOW MANUFACTURERS REGARD LIGHTING

Fig. 2

are the most prevalent are usually most poorly lighted, and if daylight conditions here were reproduced even in the most meager way—even if we only approximated daylight conditions—we could reduce accidents materially because statistics show that the largest majority of accidents occur in the night shifts. The percentage is about 2 to 1—2 accidents under artificial lighting compared to 1 accident under daylight conditions.

Fig. 2 is interesting because it shows how the manufacturers regard good lighting. Your attention is called to these figures as leading up to another argument. Increased production—79% of the manufacturers say—is their excuse for good lighting. Decreased spoilage, 71% say, is their reason. Fifty-nine per cent of the manufacturers say that fewer accidents constitute their reason for good lighting, etc.

Offhand the manufacturers admit, without any argument at all, that in half of the cases they would have fewer accidents if they had better illumination.

Now it has been shown that the total cost of accidents, the total disability payments and the total lost time of industrial operators in the United States amount to more than the total cost of artificial illumination. We should ponder over that fact. The total cost of artificial illumination in the United States is exceeded by the cost of acci-

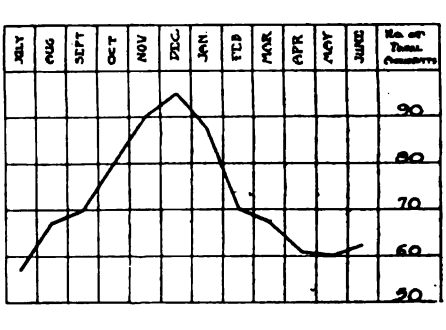


Fig. 3

dents and the loss of production resulting from poor lighting, and yet 59% of the manufacturers already agree that

poor lighting is directly or indirectly responsible for these accidents. Surely, then, it is logical to preach the doctrine of improvement and the folly of inertia.

The curve of Fig. 3 proves that artificial lighting is connected in some way with accidents. During July and August there occur, out of a maximum of some

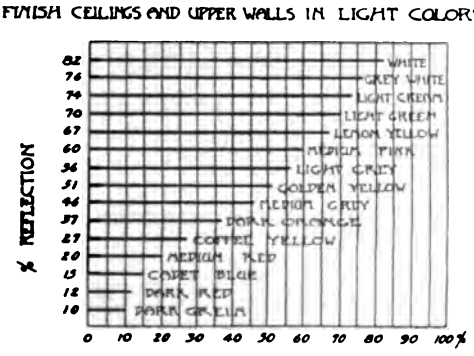


Fig. 4

95 accidents, about 60. The rate rises in October, November and December, falling off in January, February and March as the days grow longer, and down to a minimum again in May, June, July and August, when daylight is at the maximum.

This is not new information at all, but it adds weight to the argument that the fatal accidents or the serious accidents prevail in the darker seasons of the year. Other items, such as poor ventilation, low temperatures, etc., undoubtedly enter into these figures, but in tropical latitudes nearly this same ratio is found to exist.

Similarly, the majority of the accidents that do occur in the dark seasons occur when the daylight is insufficient.

THE QUESTION OF MAINTENANCE

Now, it can be shown how maintenance is responsible for good light, and conversely what poor light we will get when we do not consider maintenance. The first thing to do to get good illumination and to reduce the danger of industrial accidents is to look to the interior finish of the rooms or the factories in which we operate. The lengths of the lines of Fig. 4 represent the percentages of light reflected by the various colors. In other words, we say that ordinary white paint has a reflection value of 82%. Consider the ceiling of a room that is finished in gray-white and with a reflecting value of about 75%, then three-quarters of the light falling on the ceiling surface will be reflected. Now, if we were to neglect that fact, and were to paint our walls and ceiling medium gray, for instance, which would reflect 46% of the light, we would cut our available illumination practically in half. Down in the red and dark colors we get reflection coefficients that range in value to about 30%. Hence, one of the first things that will lead up to better illumination and fewer accidents will be the attention given to the interior finishes of the buildings.

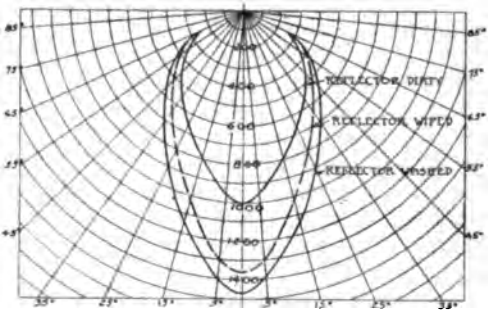
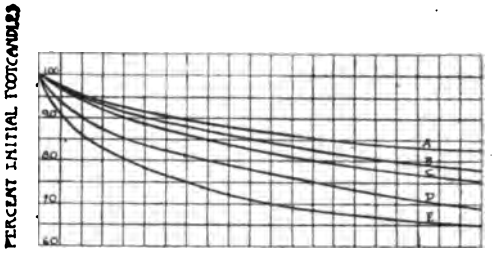


Fig. 5

This question of light-colored interiors is very pertinent. Not only must we use light-colored paints if we wish to obtain efficiency, but we must clean the paints or must maintain them. Some of us have worked a great deal in the steel mill districts, where perhaps the cheapest thing in the factory would be whitewash, and yet it was the rarest thing that we could find. We would rarely find a steel mill whitewashed, and yet the illumination of such a plant could frequently have been increased 20% by a coating of whitewash on black walls. Large expanses of pure white surfaces directly before a workman's eyes are not advisable, as neither are unshaded windows, but a sensible use of both can produce remarkable improvements.

Cleaning is essential in maintaining lighting efficiency. If the reflector giving the distribution curve of light shown in Fig. 5 be wiped, its candlepower in a downward direction is increased from 1,000 to approximately 1,350, with corresponding increases in other directions. If we go a step further and thoroughly wash the unit with soapy water and ammonia, its downward light is increased to about 1,500 candlepower. Obviously a neglected lighting fixture cannot properly perform its work, and the ones that show dirt are in many cases preferable to those that do not, for they will probably be cleaned oftener.



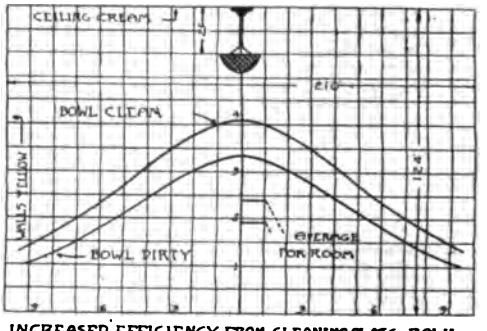
AVERAGE LOSSES DUE TO COLLECTIONS OF DUST ON REFLECTORS

A DOME ENAMELED STEEL
B BOWL ENAMELED STEEL
C - DENSE OPAL GLASS
D - PRISMATIC GLASS
E - LIGHT DENSITY OPAL

Fig. 6

"WATER IS CHEAPER THAN WATTS"

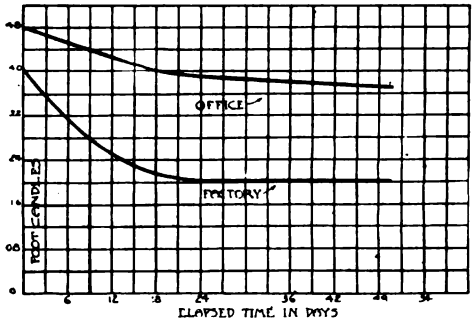
Coming back to industrial plant lighting, the curves of Fig. 6 indicate how the lighting efficiency decreases as dirt is allowed to accumulate, and we may see at a glance that though some fixtures are affected more than others, yet all suffer so much that after 2 or 3 weeks' time the light output is reduced to 85% of its original amount or less. If we consider the inverted type of glass bowl or the semi-indirect types, we find a still more astonishing condition, as Fig. 7 indicates. Merely a thorough washing results in 26% more usable illumination, and the cost of this cleaning as compared to the investment and operating expenses is very small, scarcely reaching 30% of the latter. We have a slogan, "Water is cheaper than Watts," that might well be printed on the card of every efficiency expert.



INCREASED EFFICIENCY FROM CLEANING GLASS BOWL.
THE AMOUNT OF USEFUL LIGHT IS INCREASED 26 PERCENT

Fig 7

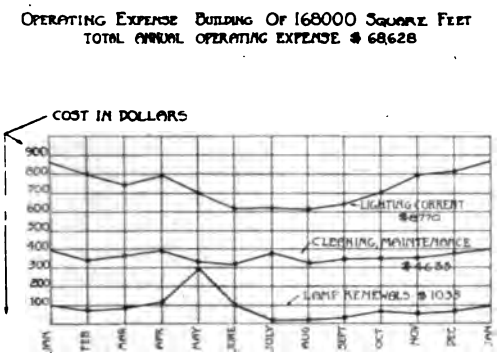
Comparing the depreciation of illumination in the office with that in the factory, we note from Fig. 8 that the factory units suffer more. This is reasonable because we find more dust and usually an oily dust in the atmosphere of the factory. In a very dirty building, after 3 weeks of neglect, the illumination may drop from 4.0 to 2.0 foot-candles, and the only reason why such depreciation is allowed to continue is because the reduction is so gradual and the effects are so insidious.



THE LOSS OF EFFICIENCY FROM ACCUMULATIONS OF DUST ON ENAMELED STEEL REFLECTORS

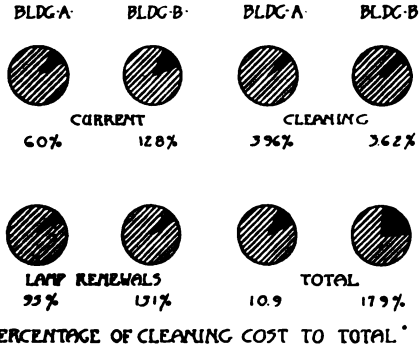
Fig. 8

If we assume or admit that cleaning of lighting fixtures and of light-reflecting surroundings is essential to efficiency, then why don't we clean? Is the cost prohibitive? It cannot be considered so in comparison to the results secured. In Fig. 9 are shown three curves, the upper one representing the cost of lighting current, the second one the maintenance,


OPERATING EXPENSE BUILDING OF 168000 SQUARE FEET
TOTAL ANNUAL OPERATING EXPENSE $ 68628
COST IN DOLLARS
LIGHTING CURRENT
CLEANING, MAINTENANCE
LAMP RENEWALS $ 1035

AVERAGE MAINTENANCE COST OF A TYPICAL LARGE INSTALLATION

Fig. 9



PERCENTAGE OF CLEANING COST TO TOTAL EXPENSES OF OPERATING A LIGHTING INSTALLATION

Fig. 10

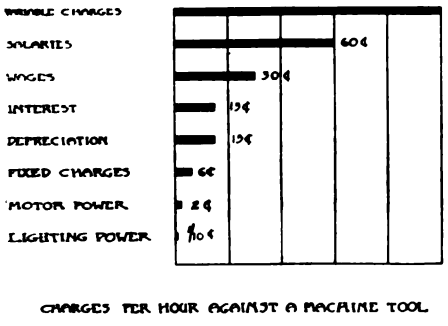
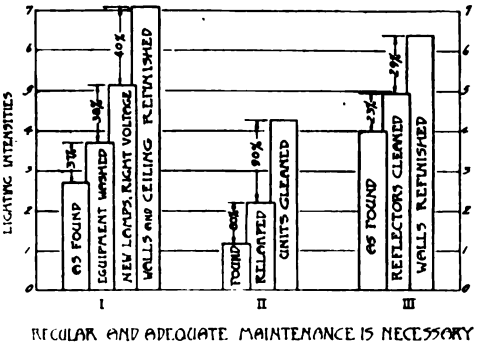


Fig. 11

and the bottom one the cost of lamp renewals in a typical large building having glass lighting reflectors and rather elaborate commercial fixtures. Out of a total annual operating cost of lighting equipment amounting to $14,438, the



REGULAR AND ADEQUATE MAINTENANCE IS NECESSARY

Fig. 12

cleaning and maintenance is represented by $4,633, or about 32%, which may be taken as a fair proportion.

Fig. 10 gives additional data relating to costs of operation and maintenance, where the percentages are taken of the total overhead operating expenses of two average buildings. These figures are self-explanatory and should be studied carefully by industrial operators, who could prepare statistics in a similar way relating to their own particular plants.

COST OF GOOD LIGHTING

Expressed in the terms of an evaluation of the working man and his possible output, the cost of good lighting is perhaps one-tenth of 1%. If we can add to the workman's output, or eliminate lost time represented by not more than 2 minutes per day, then the value of his output in that short length of time will equal his share of the cost of lighting for the entire day. Fig. 11 is interesting in this connection because it shows that lighting cost is really a small fraction of operating expenses.

In order to show what could be done with a neglected lighting installation three factories were taken which had conditions as represented by Cases I, II and III of Fig. 12. Case I was found with 2.6 foot-candles of average illumination intensity. Washing the units increased this illumination 37% to 3.6 foot-candles. Replacing old lamp bulbs with new lamps of the correct voltage-rating produced another increase of about equal amount, while finally a repainting of the interior resulted in a final intensity of over 7 foot-candles, all

without increasing the power consumption in the slightest. Cases II and III of

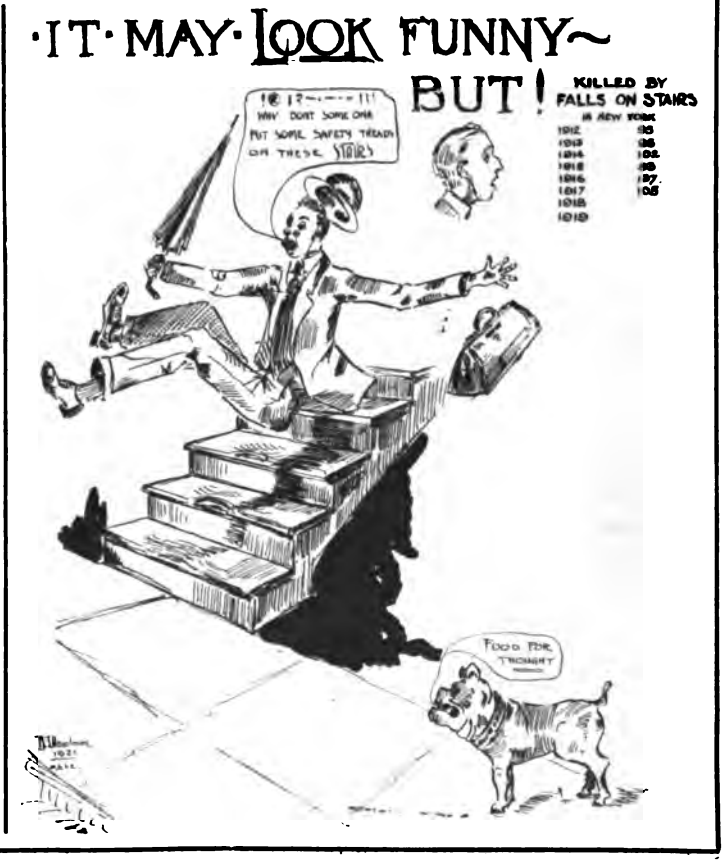
Fig. 13

this same figure show similar gains that result from intelligent maintenance, all adding weight of testimony to the fact that it pays to clean.

Probably the greatest safety slogan is the old railway crossing sign, "Stop, Look and Listen!" But if the old-time employe cartooned in Fig. 13 must stop, wipe his spectacles and step to a window in order to look, something is wrong with the illumination. If it is necessary to stop before looking, one has lost something, either efficiency of production or accuracy, or the chance to save oneself from accident and injury. If the factory is well lighted, the employes may look *without* stopping!

All these and many more arguments are being discovered as we make studies of efficiency and of safety as influenced by illumination. Many of us will recall the character Scrooge, in Dickens' novel, who liked darkness because it was so cheap, but in these modern times that idea has been utterly replaced by the larger truth that darkness is very, very expensive.

Killed by Falls on Stairs



A Study of Accidents Among Women in Industry

By Nelle Swartz

Chief of Bureau of Women in Industry, New York State Industrial Commission

Proceedings of the Fifth Industrial Safety Congress of the New York State Industrial Commission

THE number of known work accidents among women compared with those of men are few. This statement, however, can be judged only when one compares the number of men employed with the number of women. The most recent figures show a very much larger proportion of men employed than women —70 per cent against 30 per cent.

Of the known work accidents, men number about 95 per cent, as against 5 per cent among women. This is due, no doubt, to the fact that men are employed in the most hazardous occupations and at the most dangerous processes. It is for this reason that more emphasis has been placed on men's accidents than on women's. Every accident, however, is just one too many, and, since the tendency of our modern factory system is toward increase in the employment of women, a study of accidents for this smaller group now may prevent accidents for a much larger group later.

Strangely, almost nothing is known about work accidents among women as distinguished from those of men. The Bureau of Women in Industry undertook a study of work accidents among women with the hope that some light could be thrown on this subject to enable us to approach accident prevention with more understanding. One thousand compensated accident cases for women were studied, through the courtesy of the Bureau of Compensation, covering the period from June 1, 1917, to June 1, 1918.

There are, of course, certain limitations in a study based on compensation records. For example, a statement as to the time the accident occurred may vary considerably from the testimony of the employer, the employe and the doctor. In answer to the question of how the accident happened, the employer often charges carelessness of the operator, and the employe charges carelessness of the employer in not keeping the machine in better order. The limitations understood, the compensation records have decided merits. Besides the cause of the accident and the kind of injury sustained by the worker, the development of the injury is followed and the disability features noted.

The thousand work accidents were chosen within certain industries, based on the percentage of women's accidents occurring in the different industries as shown by the accident statistics of previous years. Five industries were chosen: metal, textile, clothing, paper products, and printing. The various other industries, classed in one group, were chosen to the extent of 12 per cent to round out the thousand. Almost one-half of those fall in the metal and textile industries.

MENTAL AND PHYSICAL CHARACTERISTICS

In the consideration of the woman worker, both her mental and her physical characteristics are involved. Inability to understand the English language can easily be seen to be productive of accidents. In the study of 1,000 women's accidents, inability to speak English was found in a little less than one-tenth of the cases. It is interesting to note that the percentage in and about New York City and up-State were practically the same. The clothing industry in New York City showed a larger proportion of foreign-speaking women workers injured than any other. The textile industry up-State had the next highest percentage. In conclusion, it must be said, however, that for light on the industrial

accidents studied by the bureau one must look further than to mere lack of word intercourse.

Length of service of the worker is an important factor in women's work accidents. Of the accidents studied, 18 per cent of the women had been with their employers less than a month, about 50 per cent less than 6 months and about 63 per cent less than a year.

Our responsibility for women's accidents is doubly great because it is the young women who pay the highest toll. Almost half of the women were less than 21 years of age, with 60 per cent not more than 25 years of age.

Great emphasis has always been placed on women's clothing as a source of accidents. Women's clothing may be regarded as a mental characteristic or as a physical attribute. Her mental quirks may decide for ruffles or for loose flowing ribbons, but convention and law have checked her complete self-expression, so that the responsibility for feminine attire for industrial accidents is divided. Only about 2 per cent of the accidents were traced directly to clothing. In three cases the hair of the women caught. In two other instances the hands of the workers were drawn in, because of the gloves worn. High heels worn by women are, no doubt, a contributing factor toward the number of stumbling and falling accidents among women, these ranking second to machine accidents in cause of injury.

THE FACTOR OF MARRIAGE

In industry it makes very little difference if a man is married or not married, but with women marriage is bound to be a complicating factor. In England it was the war-time experience that industrial work told heavily on the majority of married women. Upon the fatigue from factory work comes the burden of domestic tasks, much heavier than those of unmarried women. With this in mind it is significant that 28 per cent of accidents fell to married women, who composed but 10 per cent of the total number. The figures indicate, therefore, that more married women are injured in proportion to the number of employed than single women. Here, no doubt, fatigue plays an important part, where the woman becomes the breadwinner as well as the homemaker.

Almost 90 per cent of the injured working women were receiving less than $15 a week. The youth and lack of experience of the workers account, in part, for the smallness of remuneration, but it is significant that even in the war period less than 1 per cent received $25 or more a week, and more than half were receiving less than $10 a week.

SOURCE OF ACCIDENTS

Women to the extent of about 10 per cent were not actually at work, in the narrow sense of the word, when their injuries were inflicted. They were going to or from their benches or machines to the dressing room, or to and from their work for the day, along the staircases or halls. In studying the source of accidents the most striking fact that stands out is that the greatest number occurred in connection with machinery. This is due in part to the fact that during the war women for the first time were doing machine work. The metal industries lead in the larger proportion of machine accidents, with the astonishing peril of presses. The accident rate among women press operators is considerably higher than among men, according to a comparatively recent Federal report. Upon the sewing machine must be placed the responsibility for machine accidents in the clothing industry. This may seem astonishing to the lay mind, which recalls no accident at any time in connection with the sewing machine at home, but the factory power machine, setting about 4,000 stitches a minute, is a different thing from the domestic species. With such speed the operator ceases to see the needle and a flash of white light takes its place. While needle injuries are apt to be not serious, the danger comes from lack of care and consequent infection. The machine that stands out prominently in the paper industry is the corner stayer. The machines that reap the heaviest toll in the textile industry are the loom, the knitting machine and the draw frame.

From the records, the lifting of heavy burdens caused a smaller number of in-

juries among the thousand women's accidents than was expected—less than 1 per cent. Physicians claim that accident statistics on this subject can not be taken too seriously, however, since it is often difficult to trace injuries to this source, and such injuries are very often slow in developing. Employers, for the most part, have done a great deal to prevent such injuries from heavy lifting, by providing pulleys and tackle, but a type of heavy burden that escapes any serious thought is the lifting of piles of finished goods. This type of lifting is common enough; for example, in department stores and clothing factories. Here no single article is particularly heavy, yet in the thoughtless heaping of them the weight becomes a hazardous element.

Stumbling and falling accidents mounted greater than any other except machine accidents. They were about 17 per cent of the whole. Why do people stumble and fall? Poor lighting of halls or bad construction of staircases; obstacles, like piles of goods; or floors wet from spilled hot starch; or even, as in one case, a recently scrubbed floor, which had not been done early enough to have the water dried—all these are direct causes. But what of indirect causes, such as fatigue? We all stumble and fall more when we are tired.

TYPE OF INJURY

The part of the body hurt and the type of injury inflicted indicate something of the degree of severity. Of the parts of the body injured the thumbs and fingers seem to be far in the lead.

The majority of thumb and finger injuries came from machines. Of the arm and hand injuries about ½ came from machines.

Of the leg and foot injuries ½ came from the stumbling or fall of person.

Of the trunk injuries practically 2/3 came from the stumbling or fall of person.

Of the head and neck injuries almost 1/3 were from machines. The rest were scattered in origin. Of the type of injury slightly less than half were cuts, punctures or lacerations.

Most of the disabilities sustained by the injured women were merely temporary, as can readily be seen by the part of the body injured. The time element is also a means of indicating the seriousness of the injury. On the whole, the disability was low, but it may have been understated. About half the disabilities were of less than 6 weeks' duration.

PERSONAL INTERVIEWS

Full justice would not be done to a study of this kind unless some personal interviews were held with the women workers themselves. One hundred such interviews were held by the bureau and the human story of the industrial accident was told. One-half of the girls pronounced themselves unable to return to work when their compensation period was over. While personal prejudice may have biased the opinion, so large a number would indicate that some had not been able to return to work. Physical disability was not the only thing which kept the injured workers from getting back to work. Some could not find employment when they were able to work. Changes to different kinds of work were made by some whose accidents had made them afraid to go back to their old type of work. The chief criticism of these women of the compensation law as it stands was the 2 weeks' waiting before compensation began. In many instances this entailed great hardship.

EDUCATIONAL CAMPAIGN NEEDED

What facts, then, stand out as particularly important in planning for the prevention of industrial accidents to women? We are, I think, past the point where we should prohibit women from working at certain kinds of machines, etc., because the machines are dangerous. Instead of prohibiting women working on these machines the machines should be made safe for both men and women. Secondly, the industrial woman should be made more a part of the safety movement. So far they have been left out of it. It is difficult to find any safety committees in the shops where only women are employed, and in many other shops where men and women are both employed it is the men who carry on the safety campaign. A special effort should be made to get them inter-

ested in this safety movement and in this way to carry on the definite educational campaign among them.

By safety devices all machines should be made fool-proof for both men and women. While most women are not fools, we all have our foolish moments. Special emphasis should be placed on the guarding of presses and the needles on sewing machines. More emphasis should be placed on the training of the women. There is a right way and a wrong way of doing everything, and industry has gone very far of the mark in its systems of training. Women need training in industry quite as much as men, and the old theory that a woman goes into industry for only a few years, and that therefore it is too expensive to train her, is all exploded by recent figures. The right kind of training, as a means of accident prevention, pays.

Who is, then, the woman who is suffering from work accidents? First of all, she is young—under 25 years of age. She is untrained, unskilled and at the lowest rung of the wage ladder. Her injuries, so far as is known, are minor injuries, and she receives compensation for a comparatively short time, but does this tell the whole story?

In discussing work accidents and their causes we are too much accustomed to dwell only upon the concrete objects of danger, such as unguarded machinery, unlighted halls and the like. But, besides all these external factors and their effects, we must reckon with the human subject himself and the reason why among so many ever-present chances of danger so many escape.

FATIGUE THE GREATEST CAUSE

The worker's total makeup—his coolness, his experience, his quickness of reaction, his state of being, physical and mental—taken as a whole, determines his chances, and so it is that fatigue, our greatest cause of industrial waste, must be considered. Fatigue undoubtedly plays a more important part in causing work accidents among women than among men, because woman is more susceptible to fatigue than is man. We know that promptitude of reaction rises and falls with freshness of our attention, that nothing is more potent than fatigue to decrease reaction and develop muscular inaccuracies. Side by side with perfection of mechanism and safety appliances should go the study of those underlying physiological and psychological factors which so largely contribute to swell the accident rate, and which, when better understood, may be modified, if not obliterated, by the provision of periodic rest periods, reduction of hours of work, change of processes during the day and similar devices to check the inroads of fatigue.

In a study of accident causation much more is unknown than known. We have considered for the most part only concrete causes, and the whole physiological and psychological field is open before us. If we are to reduce considerably the maimed and the crippled, if we are to eliminate that bugaboo of the workers—fear—if we are to give some degree of freedom to the human agent apart from the machine, we cannot sidestep these issues.

We cannot get away from the intricacies of individual industrial development, we cannot get away from the speed of processes or the pace of machines, but we can prevent the never ending cycle of waste before remedy, destruction before attention. Plans for new workers, both men and women, should be built upon the results of accumulated knowledge and experience, not left to collect toll in process of their evolution.

Perfect machine guards eliminate unnecessary fatigue, promote training in the right way, and work accidents among women will take care of themselves.

EDITORIAL

A LIVE LANGUAGE AND ITS METAMORPHOSIS

WHATEVER philologists may decide as to the history and derivation of a word, the utility of the word must be decided by its users, and, as the work done by the word is of first importance, the clarity of its meaning is paramount to all else.

The prefix "in" is frequently used to mean "without"; examples: "active," "inactive"; "constant," "inconstant."

"Inflammable" appears, at least to the newly taught English speaker, to be in the same category, and confusion exists as to whether it is synonymous with "flammable" or is its antonym.

The National Fire Protection Association recently asked that "flammable" and "non-flammable" be used to the exclusion of "inflammable," and we immediately saw the value of the suggestion and have endeavored to co-operate.

Catching the editor of the N. F. P. A. in a lapse, we gleefully asked, in the language of the cartoonist, "How Come?" and have received an answer which is of interest and value to our readers:

"We are trying to introduce the word 'flammable' gradually by using it in our publications, but, guided by our experience with the word 'fireproof,' we are not attempting to impose 'flammable' too rapidly upon other organizations or even upon our own members who may not yet be accustomed to the change. You will be interested in our experience with 'fireproof.' It has long since been conclusively demonstrated that there is no such thing as a 'fireproof' building, and it was on this account that the association voted to substitute the word 'fire-resistive' some years ago. This is an important change because of the psychological effect of the use of the word 'fireproof,' which is likely to imply a false sense of security. Although in spite of our utmost efforts and although the word 'fire-resistive' has been largely adopted, 'fireproof' still exists to a large extent even among our own members during the discussions at our annual meeting."

This change is easier to bring about than the change of "fireproof," as it lacks the psychological and merchandising incentives to overstatement which are involved in the other instance, and, as dictionaries are merely a record of usage, a careful regard for the new forms in publications and letters will rapidly affect the rulings of the lexicographers.

THE ORCHESTRATION OF LABOR

SPEAKING before the Engineers Club of Philadelphia last fall, Harrington Emerson called attention to the orchestra as the most perfectly standardized industry—"in which a man trained in any part of the world can instantly take up his work in any other part of the world and go ahead with it without any difficulty."

"There is no reason," continued Mr. Emerson, "why an industrial plant should not run in very much the same way as an orchestra runs, and an orchestra runs with a perfection from a production point of view that we are as yet very far from obtaining in industry. In an orchestra down to the hundredth part of a second every man is perfect in his work, has a perfect instrument—a perfect tool, constantly tuned up to its maximum efficiency. He obeys the foreman,

and not only does he follow the standard practice instructions written 300 or 400 years ago, down to this absolute accuracy, but the whole group—the whole shop—works together to the hundredth part of a second."

There is certainly food for thought in this reminder.

What a wonderful thing it would be if manufacturing could be standardized to such a point! Some would say that this would reduce men to the status of machines, dwarf their souls and cramp their intellect; but musicians trained to this sort of punctilious performance of their—yes, labor—are supposed to possess souls and temperament in redundancy.

The first cause of accidents is usually said to be carelessness. For this word "inattention" has of late been substituted. Why is not "disobedience" the proper word?

If steel working, quarrying, mining and weaving could be done in union, synchronized to the waving of the foreman's baton, there would be no time or opportunity for a workman to make the wrong movement which could lead to injury. All of which, we appreciate, is "perfectly crazy" in conception, but crazier ideas have led to big accomplishments, and there may be even today some type of work into which this perfect teamplay may be introduced.

Another related idea recently advanced is that health exercises should be taken to music because the rhythm helps the functioning of the body's organs. This is furthermore featured in directions for resuscitation, as measured regularity is required either with the prone method or with mechanical devices.

Therefore, unison in work may, perhaps, not only conserve strength and time and prevent accidents, but it may also be found that industrial fatigue is lessened and production increased.

Will mechanical engineers of the future specify the tempo as well as the temper of a cutting tool, marking "largo" for a 1-inch drill and "adagio" for a ⅜-inch one?

A battery of punch presses might easily be made to run in waltz time so that the spindle and the hand could never meet, and one can imagine the operation of a heavy duty crane to the rhythm of a minuet.

The Opera House and the Engineers' Club may yet be exchanging courtesies and MacAndrews' hymn sung not only in the hold of a steamship but in every workshop of the land:

The crank-throws give the double-bass,
  The feed-pump sobs and heaves,
An' now the main eccentrics start
  Their quarrel on the sheaves.
Her time, her own appointed time, the
  Rocking link-head bides,
Till—hear that note?—the rod's return
  Whings glimmerin' through the guides.

They're all awa'! True beat full power,
  The clangin' chorus goes
Clear to the tunnel where they sit,
  My purrin' dynamos.
Now all together hear them lift
  Their lesson—theirs and mine:
"Law, Order, Duty, and Restraint,
  Obedience, Discipline."

THE INCENDIARY FIRE HOSE

HOSE used to convey water under pressure for the purpose of extinguishing fire would hardly at first thought be deemed capable of originating fire, yet that fact was completely demonstrated in a recent "testing out" of a new pumping engine by the Boston Fire Department, during the course of which test fire broke out in a length of hose near the engine, destroying about 15 inches of the hose and damaging a larger area.

The hose used was of the "jacketed" variety, in which the hose proper is enclosed in a somewhat loose woven jacket

to diminish abrasion and, incidentally, strengthen the hose.

The origin is attributed to friction between hose and jacket, which is doubtless correct. Hose of this character has often been found to have become heated to a considerable degree, but so far as records go this is the first instance of actual combustion.

Possibly the difference in rate and nature of pulsation of different designs of pumps exerts an influence, but that is a matter of conjecture, since the occurrence is hardly likely to be repeated to an extent to excite apprehension. Yet, as a demonstration of the insulating power of a thin sheet of rubber and cotton, behind which the swiftly moving cold water was unable to carry away the heat of friction rapidly enough, gives some food for thought.

A SAFETY BULLETIN FINDS A MODEST AUTHOR

To the Editor of SAFETY ENGINEERING:

SIR: No doubt you have seen the following bit of verse and admired its fitness. At least, it seems to have gone the rounds among industrial executives with no author's name. Who wrote it?

Breathes there a man with soul so dead
He can't get safety through his head,
And will not boost the work along
Because he thinks the cause all wrong?

If such a man be in our plant,
What's the reason that we can't
Treat him as junk, no more worth while,
And put him on the old scrap pile?

The lines looked so good to Willson Goggles, Inc., that the orphan poetry was given a home in a Willson industrial safety bulletin. The bulletin was illustrated with a cartoon and distributed among industrial plants and railroads.

The cartoon:

Its popularity was so pronounced that several editions were necessary and the bulletin is still "going strong."

And now from out of his hiding place comes the author of this classic in practical safety. He is J. A. Huston, safety engineer, with the By-Products Coke Corporation, South Chicago. Looking into the matter still further, we find that Mr. Huston, the "coke oven poet," is also the well-known editor of the *Coke and Iron Monthly*, and is responsible for the maintenance of safety measures and other good safety work for his company.

Industrial poetry, safety verse or whatever you want to call it, is a new field which has been given unique importance by Mr. Huston. It would be interesting to see what the other safety boys could be inspired to "bat out" in this line. All of which would materially help along the cause of safety. Don't forget, fellows, the big idea is to "make 'em think."

WILLSON GOGGLES, INC.

Reading, Pa., Jan. 14.

"School, Drive Slow"

HOW did this effective and widely prevalent traffic sign near schoolhouses originate? Who was the inventor? What led to the invention?

In October, 1914, a little boy in Milwaukee, coming out of school, saw his father waiting for him, in an automobile across the street. His father calling, "Come quick," he ran across the street as fast as he could. Neither the father nor his little son noticed a heavy truck that was coming along at full speed. Its heavy wheels killed the boy instantly. The father's grief was beyond description. He was a physician, a specialist for children. The boy was his only child. The unfortunate truck driver tried his best to stop but he was driving at a speed that made stopping impossible. The driver was heart-broken over the accident.

The circumstances of the distressing fatality came to the attention of Miss Emma M. Selle, a friend of little children. The thought came into her mind that signs should be placed near schoolhouses calling attention of drivers to the nearness of the school and commanding them to drive slow and look out for the children. If a sign of that kind had been placed near the school where the little boy was killed, the driver of the truck could have stopped his machine and the child's life would have been saved.

Miss Selle wrote the pathetic story to a city official, who turned the letter over to the Safety First Committee of Milwaukee, recently organized. There was an 8-mile speed limit ordinance in force in the city and a sign giving that information had been placed near *one* school in the city. When Miss Selle's letter came before the City Council, suggesting that the signs, "SCHOOL, DRIVE SLOW," be placed in several places near each schoolhouse, money was appropriated for that purpose and the signs were erected.

On December 12, 1916, Miss Selle wrote to President Wilson, asking him to suggest to the governors of the different States, then meeting in New York, that similar signs be placed near all schoolhouses throughout the United States. On December 14, Mr. Tumulty, private secretary to the President, sent an acknowledgement of her letter and said that her suggestion would be brought to the attention of the President. On December 18 Miss Selle received a letter from the office of the Commissioners of the District of Columbia, signed by Mr. D. J. Donovan, secretary, saying that the Commissioners of the District had received her letter to President Wilson, which the President had referred to the Commissioners, and that due consideration would be given to the placing of signs in streets near schoolhouses in order to protect the children.

On December 15, 1916, Miss Selle wrote to Governor Phillips of Wisconsin telling of the accident that had happened. Through the influence of Governor Phillips, the signs, "SCHOOL, DRIVE SLOW," were placed near every schoolhouse in the State of Wisconsin—public, parochial and even small country schools.

"SCHOOL, DRIVE SLOW," conveys three distinct thoughts:

"School" suggests the near presence of children.

"Drive" arrests the attention of drivers.

"Slow" is a command which makes every driver involuntarily grip his wheel to slacken his pace.

In some cases, warning signs, made up according to the ideas of city officials, had been placed near schoolhouses. But most of them were complicated, containing many words, and were either not read or not heeded.

Hence, the first real safety sign to protect school children was Miss Selle's "SCHOOL, DRIVE SLOW," which is now being rapidly installed everywhere throughout the United States. Other signs have been developed from the original "DRIVE SLOW" idea, such as "KEEP TO THE RIGHT, DRIVE SLOW," seen on bridges; and "DANGER, DRIVE SLOW," seen near sharp turns in roads.

Mentioning her personal satisfaction on the popularity of her sign and gratitude to the public which has responded so generously to her suggestion, Miss Selle remarked to SAFETY ENGINEERING: "As a singer, a welfare worker and a missionary, I hope my life has been a useful one." Without a thought of compensation, prompted only by her love for humanity, she has aimed, throughout her life, to work for the welfare of others.

Her three little words, "School, Drive Slow," have already saved countless lives.

Do YOU Drive an Automobile?

SAD BUT TRUE
WRECKS
I WAS A MAN WHO FANCIED
THAT BY DRIVING GOOD AND FAST
I'D GET MY CAR ACROSS THE TRACK
BEFORE THE TRAIN CAME PAST.
I'D MISS THE ENGINE BY AN INCH,
AND MAKE THE TRAIN HANDS SORE;
I WAS A MAN WHO FANCIED THIS-
I AM NOT ANY MORE.
DO YOU DRIVE AN AUTOMOBILE ?
THE KINGS AUTO CASUALTIES ARE AS BAD AS OLD T'BURK-LO-SIS.

Courtesy of F. H. Babcock, Safety Agent, P. & L. E. R. R.

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

G. E. Sanford, Pres. C. Van Horn, Treas. F. A. Doody, Sec.
Vice-Presidents: Geo. Oliver Smith and Eckford DeKay

DIRECTORS:

Thos. A. Walsh, Merchants' Shipbldg. Corp. — A. B. Bisbee, Travellers' Ins. Co. — W. J. Venning, Ætna Life Ins. Co.
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Albert S. Regula, Liberty Mutual Ins. Co. — Sherland H. Loveridge, N. J. Dept. of Labor — J. Albert Robinson, Grinnell Co.

Regular Meetings—Third Friday of each month at 8 P. M.

The next regular meeting of the society will be held on the Third Friday of February

ANNUAL DINNER AT HOTEL NAVARRE

THE annual dinner of the American Society of Safety Engineers, at the Hotel Navarre, New York, January 20, was a very delightful affair, attended by approximately 100.

Entertainment was furnished by professional talent and also by Miss Emma Selle, author of the safety sign "School, Drive Slow." Miss Selle is a soprano singer of rare ability.

There were no set speeches other than the report of the retiring president, Mr. H. Weaver Mowery, which will be published in a later issue. The new president, Mr. G. E. Sanford, was inducted into office by C. Van Horn, a past president of the society. Mr. Sanford outlined briefly the policy he will pursue during his term of office.

The committee in charge of the dinner:

F. V. Clark, Chairman, 80 Maiden Lane, New York City.

C. Van Horn, care Travelers Ins. Co., 50 E. 42nd St., New York City.

Herbert Powell, Ocean Acc. & Guarantee Corp., 59 John St., New York City.

E. D. Haggerty, Employers Mutual Ins. Co., 61 Broadway, New York City.

W. E. Crippen, Ætna Life Ins. Co., 100 William St., New York City.

Mr. Clark, acting as toastmaster, called on a number of the members, who spoke without preparation, but each had a vital message for the society.

Preceding the dinner a canvass of the mail ballot showed the election of the following named officers for the coming year: President, G. E. Sanford; First Vice-President, George Oliver Smith; Second Vice-President, Eckford De Kay; Treasurer, C. Van Horn. The new directors are: W. J. Venning, Supervising Safety Engineer, Metropolitan District, Ætna Life Insurance Company; George B. Muldaur, Liaison Representative of the Underwriters' Laboratories; W. E. Welch, of the Travelers Insurance Company, and J. Albert Robinson, Superintendent, Insurance and Inspection Department of the Grinnell Company.

POSITION WANTED

Middle-aged man with mature experience accustomed to meeting and handling people, having recently resigned position as safety director in large automobile plant, desires similar position. Salary commensurate with position of importance. Address A. S. S. E., No. 6, SAFETY ENGINEERING, 80 Maiden Lane, New York City.

POSITION WANTED

Safety Engineer and Service Supervisor thoroughly experienced in the installation and maintenance of safeguards, structural changes, safety education and organization, desires similar position. Address A. S. S. E., No. 7, SAFETY ENGINEERING, 80 Maiden Lane, New York City.

Owing to the fact that the president is a non-resident of New York he appointed an executive committee consisting of Messrs. Mowery, Van Horn and De Kay, to advise the secretary when necessary and to direct affairs at headquarters.

PROCEEDINGS OF DECEMBER MEETING

ON December 17 a meeting was held jointly with the New York Chapter of the National Fire Protection Association. The meeting was called to order by President Mowery, who introduced Mr. J. E. Curtis, president of the New York Chapter of the N. F. P. A., who made a short address calling attention to the fact that it was the first meeting of their section, felicitating the A. S. S. E. upon its interest in fire prevention work, and commending the plan of holding joint meetings.

The meeting was devoted to "Fire Protection from the Point of View of Safety to Life."

The first paper was by H. Walter Forster, who spoke of the hazard to life from fire and reviewed the activities of the past toward a reduction of the dangers.

A. T. Bell, manager of the Hotel Chalfonte, Atlantic City, spoke from the viewpoint of a hotel manager, calling attention to the peculiar problems of the hotel business, particularly fire drills, which cannot be imposed upon guests in the manner in which they are upon employes.

Rudolph P. Miller, Superintendent of Buildings, New York City, deplored the fact that in spite of all efforts to eradicate hazards in theaters, perils still exist. Continued work will be necessary to make theaters 100% safe.

Schools and colleges constituted the subject matter of Frank Irving Cooper's paper, which was illustrated with slides.

The *Menace,* a two-reel photoplay, received its first public presentation. It was produced under the auspices of the National Automatic Sprinkler Association, and shows the protection afforded by automatic sprinklers. A practical engineering lesson was intermingled with romance and a love story.

Henry A. Fiske of the Grinnell Company spoke on "Protecting Life by Automatic Control of Fires." Mr. Fiske's paper is published on another page.

The program was concluded by T. Alfred Fleming, whose subject was "America's Opportunity, Conservation of Life from Fire."

The attendance exceeded 200. Though lengthy, the program was appreciated, as evidenced by the sustained attention given it.

C. VAN HORN,
Acting Secretary.

EXECUTIVE ANNOUNCEMENTS

MEMBERS will be pleased to learn that the A. S. S. E. has been appointed sponsor for the Ladder Code, this appointment coming from the American Engineering Standards Committee.

Our Fire Protection Committee has been elected an Associate member of the National Education Association.

Safety News and Comment

G. E. Sanford, New President of A. S. S. E.

BIOGRAPHICAL details of the new president of the American Society of Safety Engineers, Mr. G. E. Sanford, safety director of the General Electric Company (given in skeleton form below), show him to be splendidly equipped by training and experience to carry on the development of the society:

Born in Windsor, N. Y., May 8, 1877.

Educated in public schools of Westfield, Mass., graduated from High School in 1896.

Attended Worcester Polytechnic Institute at Worcester, Mass., for one year.

Employed by Massasoit Whip Company, Westfield, Mass., approximately one year.

Entered Electrical Testing Department, General Electric Company, West Lynn, Mass., in 1899. Assistant foreman in that department, 1904-1906.

Engineer in charge of Application of Individual Motors to Machine Tools, 1906-1914, also in General Electric Company.

Safety Department, General Electric Company, 1914 and after.

Associate member, American Institute of Electrical Engineers, 1903. Member of same 1913.

Elected member American Society of Mechanical Engineers, 1920.

Member of Executive Committee, Engineering Section, National Safety Council.

Member of Safety Committee, Associated Industries of Massachusetts.

Member of U. S. Bureau of Standards Advisory Committee on Code for Protection of Head and Eyes of Industrial Workers.

Member of A. S. M. E. Advisory Committee on Elevators.

Member of Committee now preparing National Code on Protection of Grinding Wheels.

Outside of his professional connections, Mr. Sanford is a member of several Masonic orders.

Mr. Sanford has long been recognized as one of the leaders among the safety engineers of the country. He has cooperated in a great deal of code work, has originated many safety practices, and has an excellent record of accomplishments.

Moreover, he is endowed with a personality which constitutes him a natural leader and a man who can get things done. There is every reason to believe that the wonderful growth the society has had during the first year of its reorganized life will continue unabated during Mr. Sanford's term of office.

Father of Railroad Safety

ONE thousand safety workers on the Chicago & North Western Railway met on January 15 to honor R. C. Richards, father of the railroad safety movement. At a luncheon tendered to him at the Union League Club, Chicago, Mr. Richards was presented with a silver service in recognition of his efforts which have produced world-wide benefits to humanity, which was inscribed on the service.

Mr. Richards, who is 66 years old, inaugurated the work of saving lives and limbs on the Chicago & North Western June 30, 1910—34 years after he entered the service of the road as an office boy. That was the first safety work on any railroad, and was started about the time the idea was evolved by industrial leaders.

His service to humanity may be measured by the fact that on the Chicago & North Western Railway during the 10½ years ended December 31, 1920, as compared with the preceding similar period, there were 417 fewer employes killed and 22,600 fewer employes injured; 4 fewer passengers killed and 2,003 fewer passengers injured, and 629 fewer outsiders killed and 330 fewer outsiders injured.

Mr. Richards had won Nation-wide renown by the coining of a number of straight-from-the-shoulder safety slogans that he placed on strikingly illustrated posters, which were plastered over all the shops, yards and terminals of the North Western, wherever workmen would see them. Some of the famous ones are:

Better to be Careful than Crippled.

Better to be Safe than Sorry.

It Takes Less Time to Prevent than Report an Accident.

Better Cause a Delay than Cause an Accident.

The men who gathered to pay homage to Mr. Richards are the ones who have been intimately associated in his safety work. They are members of 85 safety committees working on the 8,500 miles of North Western Railway lines.

School for Safety Supervisors

FOLLOWING the general plan which has proven so successful during the past 2 years, the Metropolitan Safety Council, under the joint auspices of the National Safety Council and the Safety Institute of America, will conduct a school for safety supervisors on Mondays at 8 p. m., from January 10 to April 4, 1921, in Assembly Room No. 1, Engineering Societies' Building, 29 West 39th street, New York. Instruction will be given to managers, engineers, superintendents and safety men in a series of addresses on safety principles and methods. The lectures will be limited to 2 hours. They will begin and close promptly on time. Companies that are members of the Metropolitan Safety Council are invited to send their safety supervisors, engineers, inspectors, superintendents and managers to the school. A cordial invitation is also extended to other industries in the Metropolitan District to send their safety men if they are interested in the accident prevention program. Individuals who are members of the council are invited to attend. Persons who attend nine or more of the 12 lectures will be given an appropriate certificate. Further particulars may be obtained from the Safety Institute of America, 261 Madison avenue, New York.

Following is the program promised:

Lecture 1. January 10. Where, How and Why Industrial Safety Succeeds: H. Walter Forster, vice-president, Independence Associates, Philadelphia, Pa.

Lecture 2. January 17. Safety and Efficiency: L. A. DeBlois, manager, safety section, E. I. Du Pont De Nemours & Company, Wilmington, Del.

Lecture 3. January 24. Nature's Forces for and Against Workmen: Chester C. Rausch, general manager, Marine Products Corporation, East Booth bay, Me.

Lecture 4. January 31. Fire Protection—Property and Life: Franklin H. Wentworth, secretary, National Fire Protection Association, Boston, Mass.

Lecture 5. February 7. Electrical Hazards: Dana Pierce, vice-president, Underwriters' Laboratories, New York, N. Y.

Lecture 6. February 21. Plant Safety Organizations and Their Maintenance: John A. Oartel, chief of safety bureau, Carnegie Steel Company, Pittsburgh, Pa.

Lecture 7. February 28. The Foreman and Safety; George T. Fonda, general supervisor, employment, compensation and welfare, Bethlehem Steel Corporation, Bethlehem, Pa.

Lecture 8. March 7. The New Employe: A. H. Young, manager, Industrial Relations, International Harvester Co., Chicago, Ill.

Lecture 9. March 14. Shop Lighting: C. W. Price, general manager, National Safety Council, Chicago, Ill.

Lecture 10. March 21. The Workers' Equipment for Protection: Albert S. Regula, district chief engineer, Liberty Mutual Insurance Company, New York, N. Y.

Lecture 11. March 28. Industrial Surgery: Dr. F. E. Schubmehl, works physician, General Electric Company, West Lynn, Mass.

Lecture 12. April 4. Accidents Reports and How to Prepare Them: Dr. Leonard W. Hatch, superintendent, State Insurance Fund, New York, N. Y.

Accident Prevention Appliances

THE schedule rating committee of the National Workmen's Compensation Service Bureau, at a recent meeting, decided to recognize the work of the Underwriters' Laboratories in the investigation of accident prevention appliances by inserting in its schedule a statement as follows:

Materials or devices contained in the list of Inspected Accident Prevention Appliances of the Underwriters' Laboratories (207 East Ohio street, Chicago, Ill.; 25 City Hall place, New York city) shall be accepted as standard when installed to meet the requirements drawn up in the schedule.

This provision is made since all examinations and tests should be made in accordance with non-conflicting accepted standards and under standard conditions, and all records made generally available through promulgation by an organization properly equipped and qualified for experimental testing, inspections of the run of goods in factories, and service value

determinations through field inspections, thus avoiding the necessity of repetition of such work by different examiners and the confusion resulting from conflicting reports.

The action by the bureau indicates an increasing recognition of the value of the work the Underwriters' Laboratories is doing in the prevention and reduction of losses of life and property.

An Elevator Safety Feature

ELEVATOR safety codes are at the present time in the active form of revision and enlargement, and a number of new features are being introduced to prevent accidents in connection with this very widely used necessity.

In addition to regulations guarding against the open shaft the falling of the car and the more obvious incidental hazards a clause has been suggested for safe walking and adequate lighting, and the following paragraph is offered as a provision for the accomplishment of this:

"The car floors and all floor landings shall be adequately lighted at all times of operation; and the full width of the door openings for a distance of not less than 24 in. from the shaftway, and including the door saddle, shall be so constructed and maintained that persons walking thereon will not slip."

R. S. Bonsib with the Standard Oil

READERS of SAFETY ENGINEERING are familiar with the name of Roy S. Bonsib, who has contributed a number of articles to its pages and whose career becomes increasingly interesting. Mr. Bonsib is equipped for important duties, both by education and experience. He is a graduate of the Vincennes (Ind.) High School, the Madison Academy of Uniontown, Pa., and the Indiana University, from which he received the degrees of A. B. and A. M. Later he received his E. M. degree from Columbia University.

Mr. Bonsib's experience includes having acted as chief engineer of the Low Moor Iron Company of Virginia; superintendent of the Rich Patch Mines, Virginia, and supervisor, employment service department (in charge of employment, accident prevention and welfare), U. S. Metals Refining Company, East Chicago, Ind. He also acted as safety engineer of the Southern Pacific District, U. S. Shipping Board, Emergency Fleet Corporation; as chief of the Division of Safety Engineering, Working Conditions Service, U. S. Department of Labor; as director of the Industrial Bureau (in charge of accident prevention, sanitation, hygiene and fire protection), and his last connection was as director of the Tanners' Council of the United States.

Mr. Bonsib is the author of many pamphlets on accident prevention in the tanning industry. He is now to have supervision of the accident prevention activities for the Standard Oil Company of New Jersey and its subsidiaries.

Decrease in Fatal Mine Accidents

AN outstanding feature of the coal mining industry in 1920 was the marked decrease in the number of fatal accidents. Based upon monthly reports received by the United States Bureau of Mines from the various State mine inspectors covering the first 11 months of the year, 1,983 men lost their lives in 1920, as compared with 2,146 during the corresponding period of 1919, a decrease of 163 fatalities, or about 7.6 per cent. This reduction in the number of lives lost is all the more gratifying because it was accompanied by an increase of over 16 per cent in the output of coal. According to preliminary figures published by the United States Geological Survey, the production of coal from January to November, inclusive, was approximately 585,000,000 tons in 1920, while for the same period of 1919 the output was 501,000,000 tons. Thus the number of lives lost for each million tons of coal produced was 3.39 in 1920, as compared with 4.28 in 1919.

The most notable decrease is in the number of fatilities due to explosives. This class of accidents showed a reduction of 87 fatalities, or 44.2 per cent, as compared with the previous year. Accidents due to gas and coal dust explosions showed a decrease of 34 fatalities, or 19.3 per cent. There was a reduction of 31

fatalities, or 25.4 per cent, in miscellaneous accidents underground. Practically no change occurred in the number of accidents due to falls of roof and coal. A slight increase is noted in accidents caused by electricity. Haulage accidents above ground showed a decrease of 16 fatalities, or 19.3 per cent.

During 1920 there were seven mine disasters, in each of which five or more men were killed, resulting in the death of 49 men, as compared with nine similar disasters in 1919, causing the death of 201 men.

Course in Industrial Management

A COURSE in Labor and Employment Management is being conducted at the New York University, Washington square, by J. D. Hackett. Mr. Hackett is a labor consultant of experience and is at present retained by large industrial plants, several of which are located in New York.

The second semester, beginning February 3, will deal with accident prevention, safety organization, fire protection, methods of protection, brigades; medical and surgical care, medical treatment, emergency hospital; hygiene; ventilation, heating, humidity, lighting; lunch rooms, cafeterias: sanitation, wash rooms, locker rooms, laundry, sanitary accommodations, cleaning, etc.

Making Odorless Gas Safe

LOSS of life and property often result from leakage in the distribution of natural gas and blue water gas used for fuel and illumination. The detection of leaks by adding stenches to the gas would reduce losses materially and would therefore promote economy to the producer and safety to the consumer.

"Blue water gas is particularly dangerous, as it is almost odorless and is very poisonous because of its large content, nearly 35 per cent, of carbon monoxide. The addition of a stench to the gas gives warning of the presence of the gas and makes possible the saving of life.

"Natural gas also has little odor. Leaks in the pipes, particularly out of doors, are seldom detected until the loss of gas is noticed, and then the leaks are difficult to find. Many gas explosions, some of which wreck buildings, might be prevented by a warning stench. Moreover, although the principal need for stenches is in natural and blue water gas, they might also be used profitably to strengthen the odor of other gases.

"The impregnation of natural gas or blue water gas with a stench-imparting chemical provides a means for reducing loss from leakage and for eliminating accidental poisoning and explosions."

This subject is discussed in Technical Paper 267, issued by the Department of the Interior, and of which the authors are S. H. Katz and V. C. Allison. It appears to be a substantial contribution to both public and industrial safety.

"Carelessness Caused this Mess"

THE Anaconda Copper Company, Butte, Mont., has a talented office boy in its general office. His name is Earl Holman, and he appears to be one of the best of the poets of safety. The verses below bear the title, "The Catastrophe":

Sam Brown
Laid down
A wrench upon a motor;
Lost his life,
Left a wife,
This is what they wrote her:

"You're bereft,
Samuel left
Suddenly, today;
Silly fool
Left a tool
Lying in the way."

"Tool dropped,
Motor stopped,
Smashed to smithereens.
Pieces flew
Right through
Sammy's shirt and jeans."

Sam passed,
Just gasped,
Funeral tomorrow.
Carelessness
Caused this mess,
Misery and sorrow.

California Industrial Commission

THE report of the California Industrial Accident Commission for the year ended June 30, 1920, shows a substantial decrease in the industrial deaths and permanent injuries during 1919, as compared to 1918. In 1919 there were 586 deaths, as compared to 706 in 1918, a reduction of 120. The permanent injuries for 1919 numbered 1,714, as against 2,100 for 1918, a reduction of 386. The total number of injuries in 1919 was 4,180 greater than in 1918. In 1919 there were 108,947 industrial injuries, as compared to 104,767 in 1918. The temporary injuries in 1919 numbered 105,952, as against 101,961 in 1918. To find a reduction in the number of deaths and permanent injuries, in the face of this increase in temporary injuries, is significant.

VEHICLES CAUSED MOST DEATHS

There were 149 deaths in railroad, vessel and stevedoring operations, 119 in construction and 95 in manufacturing. Agriculture was responsible for 40 deaths, and public utilities for 45. The greatest single cause of death was vehicles, 223 deaths resulting from the operation of boats, cars, automobiles, wagons and other vehicles. There were 31 deaths from electricity, 86 from machinery and 12 from the explosion of firearms. Nine women were killed while at work in 1919.

The statistics show that following the 586 industrial deaths there were 656 total dependents as the result of 278 fatalities; 106 partial dependents were left in 53 fatal cases; in 170 fatal cases there were no dependents, and in 85 fatal cases the degree of dependency was unknown. The average age of the widows was 39.3 years.

The average age of the killed during 1919 was 34 years, and the average wage was $28.51 a week, as compared to 39.9 years and $25.01 a week for 1918.

Occupational diseases reported in 1919 numbered 455; in 1918, 445; in 1917, 506; in 1916, 348.

The dependent children averaged 9 years.

INFLUENZA IS "INJURY"

One of the most important decisions upheld the commission's interpretation of the word "injury" in a case where death resulted from influenza found to have been contracted in the course of employment. The Supreme Court's decision was unanimous on June 30, 1920, in reviewing the case of Geraldine Slattery vs. City and County of San Francisco. Applicant's husband, a hospital steward, had to care for influenza patients. It was held the work was the proximate cause of his death.

REHABILITATION

A total of 1,074 men and women needing reeducation because of their serious injuries were in touch with this department during the 12 months. The commission's representative is a young man who lost both his hands in an accident. He is able to do practically everything that can be done by a man with two hands, and thus speedily wins the confidence of the crippled.

MEDICAL AND SURGICAL TREATMENT

The new methods of medical and surgical treatment and rehabilitation that proved so successful during the war were introduced in California, to the benefit of injured workers. Occupational and physical therapy have been installed. Convalescent departments in industrial plants will aid human rehabilitation.

ORDERS AND ACTIVITIES

General lighting safety orders were completed. The electrocution of a nurse in a doctor's office resulted in steps being taken to test high frequency electric apparatus used principally by the medical profession for electrotherapy, and safety orders are in preparation to remove the risks taken by those engaged in the professions. The electrical utilization safety orders are being revised.

Designs of existing buildings and other structures were checked, fire hazards in factories, hospitals, hotels and theaters removed, revisions of the general construction safety orders prepared and conferences held with contractors, engineers, architects and others to plan for safe operations.

The mine safety orders were revised and tunnel safety rules completed and distributed. A special study of mine ventilation has been started.

The problem of grain dust explosion was taken up with the United States Grain Corporation. Steam shovel and locomotive crane safety orders were adopted. Gas welding and cutting safety orders and petroleum industry safety orders are in preparation.

Safety and Thrift

IT has been suggested recently that the saving habit helps to prevent accidents—that those who are thrifty are careful persons, not only in one way but also in other ways.

This was the opinion of safety engineers and experts at the Industrial Safety Congress, held in Syracuse recently. Many experts held the view that when a man is not worried about financial or other matters he can concentrate more fully on his job.

Safety engineers and experts in indus-

trial problems present at the Safety Congress were of the belief that a large percentage of industrial accidents could be charged directly to carelessness, superinduced by domestic troubles, generally of a financial nature. They stated that where workers save their money and are financially secure they are more attentive to their work, more careful about what they do and therefore help greatly in preventing industrial accidents.

Death of William H. Sayre

WILLIAM H. SAYRE, president of the American Abrasive Metals Company, died suddenly at his home in Glen Ridge, N. J., on January 6, from a severe heart attack. Born in Mauch Chunk, Pa., in 1865, he was a member of the Sayre family, prominent in that State. In his home community he took an active and prominent part. He was senior warden in the Christ Episcopal Church of Bloomfield and Glen Ridge. Surviving him are his wife, four sons—William H., Jr., Austin B., Ford Kent, and George Pomeroy Sayre—and two daughters—the Misses Elizabeth Knight and Sylvia Sayre.

Ever since his graduation from Lehigh University as a mechanical engineer, in 1886, Mr. Sayre had been actively engaged in some line of business in which his engineering ability was applied. He was a member of the American Society of Mechanical Engineers.

In the safety engineering field he was known especially for developing the business of the American Abrasive Metals Company, which he organized in 1911 and of which he was president until the time of his death. Under his guiding influence the product Feralun, in various forms of anti-slip treads, has become nationally known and extensively used as an important means of accident prevention.

His company has been a member of the National Safety Council and the Safety Institute of America almost from its beginning, and largely through his encouragement the reorganization of the American Society of Safety Engineers was undertaken so successfully that it has resulted in a general recognition of the importance of applying engineering skill to accident prevention.

In assuming active control of the American Abrasive Metals Company, the vice-president, R. S. Edmondson, announced that the policies, plans and high ideals of the departed president would be carried on without interruption.

Eckford DeKay Forms New Company

RESIGNING as vice-president of the T. G. R. Pierson Company, Eckford C. DeKay has organized a new company, called DeKay & Co., to handle all classes of insurance, specializing in workmen's compensation and accident prevention. For seven years Mr. DeKay was compensation rating expert of the New York State Insurance Department. He is a fellow of the Casualty Actuarial Society and was recently elected a vice-president of the American Society of Safety Engineers.

C. N. Young Moves to Washington

CHARLES N. YOUNG, late of the National Workmen's Compensation Service Bureau, New York City, has become Actuary of the Insurance Department, United States Chamber of Commerce, Washington, D. C.

Failures of Sprinkler Systems

THE ardor of underwriters regarding "sprinklered" risks has been dampened somewhat, according to William H. Gartside, second assistant manager of the Western department of the Fireman's Fund Insurance Company, who says:

The unusual number of losses that have occurred in sprinklered plants within the past 2 or 3 years has rather dampened the enthusiasm of some companies for this class, especially at the prevailing low rates.

The stock companies lost on sprinklered plants over $3,000,000 in three fires in 1919, $2,000,000 in two fires in 1918, and over $3,500,000 in one sprinklered plant fire in 1917. In practically every case the loss occurred from a minor hazard not contemplated when the insurance was written, or carelessness on the part of workmen or employes, indicating the great necessity of thorough inspection and at-

tention to minor hazards heretofore considered of not much importance.

Of the craze for production, involving carelessness as regards fire perils, Mr. Gartside observes:

One of the greatest menaces today to the proper protection of manufacturing plants against fire is the craze for production, which in many cases has thrust into the background the subject of fire protection, the upkeep of fire prevention devices and the care and orderliness of the premises which is customary in normal times. The companies have been obliged in some cases to order cancellation of the insurance in order to bring about improvements which would justify a continuance of their liability.

Education in Accident Prevention

A VOLUME of much interest to everyone engaged in the work of accident prevention is "Education in Accident Prevention" by E. George Payne, Ph.D., president of the Harris Teachers' College, St. Louis. It is an outgrowth of the work so successfully done in the public schools of St. Louis to adjust the curriculum to the needs of life, especially to teach children the wisdom of keeping in their minds, all through their lives, the avoidance of unnecessary perils to life and limb. In other words, Dr. Payne's book inculcates the "safety habit." The publishers are Lyons & Carnahan, New York and Chicago.

To Prevent Horses from Slipping

A PRIZE of $1,000 is offered through the American Humane Association, 287 State street, Albany, N. Y., for the most satisfactory horseshoe or device that will prevent horses from slipping on roadways and wherever in service. Millions of dollars of loss accrue each year from the uncertainty of the footing of horses, mules and donkeys, which bear the burdens of civilization. Accidents, fatal and disabling, happen, not only to horses but to human beings, as a result of icy roads in winter and slippery pavements at other times of year.

Inquiries regarding the terms of the competition should be addressed to the president of the association, Dr. William O. Stillman, at the address given above.

Labor Claims Right to Take Chances

THE Surgeon General of the United States Navy, in a recent report records this singular incident (italics ours):

In May and again in August a study of grinding and eye injuries resulting therefrom was made by Captain E. G. Parker, Medical Corps, United States Navy, who expressed the opinion that Article 392, Naval Instructions, was not being rigidly enforced.

In October a safety engineer was again assigned to the yard, and one of his earliest activities consisted in seeking enforcement of the provisions for eye protection. This subject is of vital importance, inasmuch as the second largest class of accidents—18 per cent of all accidents—could be practically eliminated by such measures.

Despite the reasonableness of the provision that goggles shall be worn while grinding or performing other operations that are hazardous to the eyes, much objection is raised by certain employes.

In one shop where the master mechanic sought to enforce the provision and penalized two or three men for failing to protect themselves he was waited upon by a delegation from a local labor union which insisted that the rights of workingmen as free citizens were being infringed upon by such rules!

Connecting Up Codes and Appliances

THE Pennsylvania department of Labor and Industry has issued a bulletin on approved safety appliances pertaining to boilers, which is believed to be the first State publication of its kind in which an attempt has been made to connect up safety codes with safety appliances.

Handy Instruction Books

THE Wind River Lumber Company of Cascade Locks, Ore., has published a meritorious instruction book on "Fire Drill and Orders" for the use of its employes. The company has in preparation another pamphlet covering all safety rules in connection with its operations.

Flammable Picture Films

THE editors of the *Youth's Companion*, on notification by the National Fire Protection Association that the non-professional use of nitro-cellulose motion picture film in-

troduced a dangerous fire hazard into the homes of its subscribers, at once withdrew from its premium lists the home moving picture machine designed for display of the professional film used in motion picture houses, and agreed to advise its interested subscribers of the reason for such withdrawal.

Mining Equipment and Practice

AT an informal conference of representatives of leading organizations interested in the standardization of mining equipment and practice, including considerations of safety, it was unanimously voted to recommend to the American Engineering Standards Committee that there be organized a General Correlating Committee for Mining Standardization; that this committee be made up of representatives of organizations which are now engaged in standardization work, or which might be expected to engage in it; and that the committee might well be started with a nucleus of two representatives of each of the leading National organizations interested in the subject. In compliance with this recommendation the American Engineering Standards Committee invited the five organizations mentioned below to designate two members each to represent them upon such a general correlating committee, with the understanding that the nucleus so formed might enlarge itself:

The members of the General Correlating Committee and the organizations they represent are: American Institute of Mining and Metallurgical Engineers: Graham Bright, Howard N. Evanson. American Mining Congress: Chas. A. Mitke, Warren R. Roberts. Mining and Metallurgical Society of America: E. S. Berry, B. Britton Gottsberger. National Safety Council: F. P. Sinn, S. J. Williams. U. S. Bureau of Mines: E. A. Holbrook, O. P. Hood.

The committee has held one meeting. Summaries are being prepared of the standardization work now in progress in the various organizations. The work of the committee will include such matters as:

Delimiting specific projects which might be most advantageously handled as units.

Recommending the order in which the various projects should be taken up in order that the needs of the industry should be served.

Making recommendations as to what bodies should act as sponsors for specific projects, and as to what bodies should be represented upon the sectional committees for such projects.

Trying to Be the Safest Railroad

THE Hocking Valley Railroad Company intends that 1921 shall be a year of safety. Mr. Coit, its safety engineer, in a letter to the employes on January 1, remarked:

Our purpose is that the Hocking Valley Railway Company shall be the safest of roads for the public, employes and property entrusted to its care. Elimination of unsafe conditions, unsafe practices and the exercise of safety control by supervising officials, and proper regard by employes for their own safety are the methods by which it is hoped to prevent personal injury. Unsafe practices, which cause by far the majority of accidents, are under control of employes themselves; we insist that chance-taking shall neither be done nor permitted. Remember, it is better to cause a delay than to cause an accident, if for no other reason than that it takes less time to prevent an accident than it does to report it.

Fires from Electric Irons

THE Louisiana fire marshal notes that the summer months have brought to the State fire marshal's office an increased number of fire reports bearing on fires originating from the careless use of electric irons. "As the use of these irons becomes more general throughout the State, unless proper care is exercised in their use, a corresponding increase in the number of fires from this source must result unless users practice caution. The real danger is allowing the current on, unwatched. The iron becomes greatly overheated during the time it is not in use and unwatched, and in a little while the iron rest also becomes overheated and fire is the result. Eliminate the danger by disconnecting the cord at the socket."

Safety in Chemical Industries

BULLETINS proposed for the chemical section of the National Safety Council are interesting and varied:

1. Bulletin showing an effective way to wash acids or caustics from the eyes. (Photograph showing a workman bending over a water bubbler which has been installed as a drinking fountain, and allowing the water to squirt into the opened eyes.)

2. Bulletin showing the workmen that water, and lots of it, is the first thing to apply when burned with acids or caustics. (Photograph showing a workman fully dressed in his work clothes standing under a running shower bath.)

3. Bulletin emphasizing the rule that workmen at work on acid lines should work from above. (Illustrated by a photograph showing a workman in that position and at the same time wearing rubber gloves and an acid helmet.)

4 Bulletin showing what some men do when it is impossible to obtain suitable protection against acid and acid fumes. (Illustration showing a workman rubbing vaseline on his arms.)

5. Bulletin showing the only safe way to enter a tank which has been used to hold acid or when there is the least danger that noxious fumes are still present. (Photograph showing a workman properly protected by rubber boots, rubber gloves, a life line and an oxygen helmet, ready to enter a tank car through the manhole.)

6. Bulletin calling to the attention of the workmen the danger of "eating" acid or other chemicals. The purpose of this bulletin is to convey the information that chewing-tobacco and eatables absorb acid fumes. "Don't chew tobacco or put into your mouth eatables that have been carried in the pockets of your work clothes. (Illustrated by a workman clad in his work clothes at some point within a chemical plant taking from his pocket a plug of tobacco and biting off a "chew.")

7. Bulletin showing that personal cleanliness in the chemical industry is absolutely necessary. No workman should leave the plant without taking a bath and changing his clothes. (Photograph of a workman seated in front of his double-compartment locker disrobing preparatory to taking a bath. Shower bath should appear in the same picture.)

8. Bulletin advising the workmen to wash their faces immediately before and after using rubber goggles. (This can best be illustrated by two photographs; one showing a workman washing his face, and the other showing him smilingly adjusting his rubber goggles in position on his face.)

9. Bulletin showing the danger involved when two men attempt to carry an acid carboy by hand. This probably can best be illustrated by three pictures: One showing two workpen carrying a carboy by hand. The second photograph showing the result of an accident when one workman has stumbled and fallen and some of the acid spilled. The next picture showing one of the workmen carrying the carboy in a modern two-whelled carboy carrier.)

10. Bulletin warning workmen not to store acid carboys in the direct rays of the sun or near steam coils. (Photographs showing carboys stored in the sun and another photograph showing carboy stored near steam coils.)

11. Bulletin advising workmen to wear wool clothing as much as possible. (Photograph of a workman clad in wool shirt, wool cap, rubber boots and rubber goggles.)

12. Bulletin advising workmen to wear respirators or oxygen helmets whenever entering a room which might be filled with poisonous fumes and vapors. If a man cannot obtain a respirator or helmet, he should be advised to take short, shallow breaths. (Photograph of a workman properly clad, wearing rubber gloves, rubber boots and a respirator with goggle attachment.)

A Change of Interest and Importance

MR. GEORGE OLIVER SMITH has left the Doherty organization to become vice-president and chief engineer of the American Atmos Corporation (formerly the Draeger Oxygen Apparatus Company) of Wilkinsburg Station, Pittsburgh, manufacturers of The Paul Breathing Apparatus.

Mr. Smith has been with the Doherty organization for eight years. He originated its safety work which he has developed to a point of marked efficiency.

As busy men always have thrust upon them duties in connection with trade and professional societies, it happens that Mr. Smith is first vice-president of the American Society of Safety Engineers, a member of the executive committee of the National Safety Council, and an active member of the National Electric Light Association, the American Gas Association and the National Fire Protection Association.

His ability and personality insure his success in his new connection.

Goggles Saved His Eyes

AN employe was using a cold skimmer to take slag off the top of molten metal. The metal exploded and covered his face and hands. His eyes were saved through the wearing of goggles.

Equitable's Safety Engineer

ON October 20, John R. Brownell entered the service of the Equitable as safety engineer in the Department of Safety and Personnel. Mr. Brownell is a graduate of the Massachusetts Institute of Technology and is recognized as one of the pioneers in industrial safety. After 10 years' experience as construction engineer at the Steelton plant of the Bethlehem Steel Company, he was made supervisor of safety of that company, and achieved a record that earned for him a prominent place among the safety engineers of the country, resulting in his being called from Pennsylvania to the Pacific Coast to organize the Department of Safety for the California State Industrial Accident Commission. The work done by that department under his direction placed California on the safety map as one of the leading States in industrial accident prevention.

How to Reduce Accidents

"ONLY one thing can reduce the vast number of accidents occurring and that is for every employer to determine that no preventable accidents will be tolerated in his establishment," the Ohio Industrial Commissioner says.

Priceless Census Records Burned

Photo from Western Newspaper Union

Priceless census records, dating back to 1790, when the first enumeration of the population of the United States was taken, were destroyed in a fire of undetermined origin at the Department of Commerce, Washington, D. C., on January 12. The records included figures from every census except the census of 1920, it is stated. Damage to the building itself was unofficially placed at from $10,000 to $15,000.

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 450 SAFETY TEACHING POST-GRADUATE WORK.—The writer recalls coming home one afternoon during his first year at college and finding his father completely worn out. In answer to an inquiry as to why his father should be so tired after a day of lecturing at a post-graduate school his father remarked that in post-graduate work one is dealing with trained minds and that one cannot simply state theories as facts and expect them to be swallowed whole, as one can in under-graduate teaching.

In my experience visiting various types of risks in the interests of safety, I find that we directors of safety have too often treated the workman as an under-graduate body and have expected him to swallow our theories on safety whole and without question.

The workman at his bench is in a sense a post-graduate man, a man who is often master of his trade and of the machine before which he works. He knows the kinks of that machine, its good and its bad qualities, ofttimes far better than the designer of the machine himself. To expound safety theories to such a man as law and doctrine not to be questioned is to lose this man's interest in safety for all time.

Simon Lake had the European war won for this country on his theory of the submarine, but the common seaman who knew the shallow depths of foreign harbors and channels of approach knew far better from experience that the heavily armored and big-gunned ships would prove the standby of his country and his home.

Usually it is the way in which safety doctrines are taught or placed before the workman that explains why the safety engineer is so often considered an unnecessary d—d fool and tolerated by the workman as an evil of the times, to be put up with and borne in much the same manner as his employer looks upon the red tape details of his income tax reports.

In my practice it is my purpose to avoid at all times telling a workman that safety guards are created in his interests in order to make a machine fool-proof. In the first place, the workman is not a fool, and, in the second place, the law of self-preservation makes a man use a reasonable degree of caution.

On the other hand, I always try to convince the workman that safety engineering is in its infancy of development, and that it is the object of the State, working through its industrial commission and the insurance companies, to compel manufacturers to house all working parts of new machinery; and, after presenting to him my theories on the subject, I try to draw out his opinions based on his practical experience and thereby win his interest in the subject as he feels himself becoming a part of the new order of things.

As the turbine engine was first conceived in the brain of a stationary engine driver, so many of our present standard guards will attain perfection from suggestions originating in the brains of workmen themselves.

The co-operation of the employer, while important, is a secondary matter, as his assistance can be easily won by means of laws and bringing to bear pressure in various ways. But the workman's co-operation, so vitally necessary to the success of our undertaking, can be obtained only by the realization on our part that we are not preaching to the untrained minds of an under-graduate class, but that our work is post-graduate work in its fullest sense.

Our opinions cannot be handed out as doctrines of law to be swallowed without question or thought, but, rather, we must present convincing and satisfactory arguments showing on what fundamental data our conclusions are drawn, the scientific basis upon which our conclusions are based, and giving the advantages in the interest of safety to be derived as a direct result.

It is my belief that only by such means and such presentation of the subject of safety before the workman will we finally obtain the desired goal of our ambitions along these lines.

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No. 451 A GUARD ON THE SAW IS WORTH TWO ON THE FLOOR. — Safety engineers frequently find that the hardest man to interest in safety protection and equipment is the skilled mechanic. A machinist, for instance, will often look with scorn on the installation of a belt shifter which is being placed for his convenience and protection, claiming that he has always shifted by hand and has never been injured yet. He will take with some reluctance the statement of the safety man that his records show that numerous accidents have occurred from the metal lacings in the belt as the operator's hands came in contact with them as he shifted for a higher or lower speed.

A power press operator will insist that he is the original safety expert and that guards were not made for him, forgetting that a machine sometimes functions prematurely and always without due notice to the operator to withdraw his hand.

We met with these characteristics when we tried to introduce saw guards in the pattern shop of our plant. We were told that the men in this department were of the highest skilled type and that they were accustomed to the use of the circular saw and all of its companion saws. We were told that the place for our propaganda was in the wood shop, where the men were hired with little or no experience and a device such as we were hoping to introduce would be necessary. As a clincher to the argument we were told the length of service of each individual worker who was likely to use the saw, and when we heard of this one and that one who had worked 10 or 15 years at the trade and could still count 10 fingers we thought the jig was up.

It was unfortunate that an experience such as we are about to relate was necessary to carry out our plans, but just as we were skidding on the saw guard deal a man ran past us with one hand clasping the other and blood spurting in a crimson stream. We followed the trail to the factory hospital, where the man, with his thumb all but severed, stated that he had been working at the pattern business for 15 years and "this was the first time."

We hurried back to the department and found workmen busily engaged in placing the guard on the saw, "where it wasn't needed." The guard has been on for the past 3 years and has not been removed except for repairs. We were told that this saw had such a variety of usages that the guard would be a nuisance. This would seem to lead us to the conclusion that with a little forethought a saw guard can be used in most all ordinary circumstances. It might be necessary to rearrange the forms and jigs used in cutting various parts and pieces.

Sawyers have frequently told me that they cannot cut a thin strip of board, say three-quarters of an inch thick, without removing the guard. We have always taken the pains to demonstrate how this can be done with the guard on, with safety and accuracy.

Take a piece of board the length of the saw guide and about 3 inches wide. Clamp or fasten it to the guide so the board lays flat on the table. The meas-

urements are then taken from the saw to the edge of this board and the guard allowed to rest on the board. Any width can be cut with this simple arrangement, and it works out a lot better if this board is fastened permanently to the guide, or if this is not convenient the board may be hung up near the saw, where it can be used when needed.

Saw guard used on a tilting table. This guard can be instantly lifted out of range, in case of a special job, and as quickly replaced.

The saw guard shown in the picture is a development of our own safety engineer's and is used in different designs or models throughout our plant.

As will be noted in the photo, the front of the guard acts somewhat independently of the hood, as it is hinged at the back of the guard. As the table tilts the front accommodates itself to the angle of the table; the guide is placed below the guard, where a very creditable job can be done with all safety to the operator.

The hinged front was also designed to act in another way different from most saw guards. As the material is pressed against the guard at the angle, the front raises and lifts the hood proper; as the material passes through, the front drops down, acting as a protection to the operator from the saw during the rest of the operation.

We must admit that there are some jobs that are put up to the variety sawyer that are hard to do with the guard on the saw. These jobs may be said to be rather infrequent, though, and, as we have stated, a little study on the part of the operator will usually be productive in developing a way of using the guard. These special jobs are not always dangerous, either, and the big item is that the guard be replaced when this special work is over. So often we have found that a man will not take the time to fix the saw up for the other fellow, although he is never slow in dismantling it.

Finding in our experience that a guard is often condemned because it is such a task to replace after removing it, we tried to overcome this criticism in the guard shown in this article. As will be noted, at the upper portion of the steel plate supporting the hood there is a wing nut which fastens the plate to the standard; this nut can be loosened with the thumb and fingers and the guard thrown upward and backward, where it is held by tightening up the thumb or wing nut so that the plate engages the dowel pins on the standard. The guard can be quickly brought down to exact position ready for business.

We have found that a guard on the saw is worth two on the floor. We try to make frequent inspections and keep our guards in repair. We have succeeded in a great many instances in cultivating a real spirit of co-operation between the operator and the saw guard.

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No. 452 SMALL SAFETY ORGANIZATIONS.—It is an established fact that safety organizations as carried on in large plants have proven a valuable asset, not alone in accident reduction but in adding to the general efficiency of the plants.

The managers of smaller plants, viewing the success of safety organizations in the larger plants, raise the question, "Would a safety organization be of equal value in the smaller plants?" Naturally, a safety engineer immediately answers, "Yes." But he must also produce all the necessary evidence to convince the board of directors as well as the managers of the plants that this is so.

One of the most vital reasons for having safety organizations in small plants as well as large plants is the ratio of accidents per 100 employes. The small plant manager puts too much stress on the vast number of accidents occurring in the big plants as compared to the number in his plant. The real fact that small plants have about twice as many accidents per 100 employes is proven by the data of various large and small plants. This one fact alone demonstrates the necessity of a safety organization in every plant of 50 or more employes.

Collected data have proven that 75 per cent of all accidents are of a non-mechanical nature, such as infections, burns, falls, handling of material, and bruises. While non-mechanical accidents are not so gruesome as mechanical accidents, yet falls, infections, electricity, etc., are killing or crippling more employes than machinery. This should eliminate the idea that plants with little or no machinery are immune from serious accidents. Accidents slow down production, lower the morale of the plant, frighten away the higher class applicants and increase the labor turnover.

Systematic accident prevention work will positively decrease the accidents in any size plant. It builds up the morale and develops a spirit of co-operation and goodwill among the employes. It will prevent lost-time accidents and increase production. It will help lower insurance rates in several ways.

It stops the habit of knocking on wood to prevent accidents, and starts men knocking accidents instead.

Facts prove that 90 per cent of accidents are caused by thoughtlessness, carelessness, etc. However, this does not place the blame entirely on an injured employe. Unless the employe has been warned of the danger involved in his work, moral responsibility for the accident rests also with the management.

The manager can lower his moral responsibility only through a systematic accident prevention campaign. This is why we say, "Yes, safety organizations are of equal value in plants of all types and sizes."

Prizes for December Articles

First Prize. No. 447. E. W. Cummings, Plant and Safety Engineer, The Holt Manufacturing Company, Stockton, Cal.

Second Prize. No. 448. W. S. Brown, Safety Engineer, General Casualty and Surety Company, Detroit, Mich.

Honorable Mention. No. 449. F. R. Lilley, Safety Engineer, Maryland Casualty Company, Atlanta, Ga.

Comments by Members of the Committee

To my mind Article 447 should be rated in first place. Of the subjects touched upon in this issue safety committees are by far the most important and fundamental to the success of a plant safety program.

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I may be a little biased in selecting No. 447 as the best article, as he outlines a policy that I have always maintained to be one of the fundamentals of safety. Especially do I commend his 2 hours' discussion after dinner, because, when the wrinkles of the abdomen have been ironed out with a good feed, following a few hours' rest after the daily toil, our minds are more alert to other things, especially to the protection of the home. This is one of the main objects of safety, to conserve the human element from dismemberment; that they may work safely. This will put joy and vigor in their efforts to a greater production; knowing that the conditions of the plant will ensure their safe return home with restful minds and sound bodies, this spirit spreads joy to the home and communities.

I have always felt that the object of safety is to ease the mind, to promote

better health and the elimination of industrial cripples. It is essential to the success of safety to give it the broadest of discussion, as it is the best propaganda for its promotion. We can read volumes without number, as well as tons of literature, but, unless there is an outlet to the knowledge gained, many golden treasures are hidden, and it becomes safety for one, and not safety for all, as it should be.

The Xmas present plan is good, as I feel that everyone should be rewarded for his efforts. Methods of this kind encourage those who devote their time in the interest of others, and they should always be encouraged by rewards, that they may put forth greater efforts. The fires of ambition and usefulness should be kindled, that they may not die from want of fuel.

No. 449 relates a well known safe practice which a good many plants have adopted.

No. 448, though rambling in subject matter, preaches quite a sermon. Would not this article have more of a punch if it gave more facts and instances and let the reader draw some conclusions for himself?

No. 447 sticks to his subject well and gives a clear insight into the workings of his safety organization. He has evidently solved the problem of accident prevention, for his men do the real safety work and they get the credit for it. We have all heard safety men refer to the foreman of their plant as the key man and other like terms, but did they go on and explain how they had built their organization around him so that he had the chance to fill the role? Not many do. They usually go ahead with "What I have done," and "What I am going to do." I give my vote to No. 447.

Conducting a successful safety committee meeting is not easy, and the idea of No. 447 helps much.

The remarks of No. 447 regarding the safety committee system are hardly susceptible of adverse criticism under certain conditions: (1) The employer's attitude to safety is that it is as much a part of operating conditions and necessary as any other element of production, and (2) the work of committees is actually valued, through consideration given to their recommendations and these carried out where possible; otherwise full explanations given of the reasons for inability to do so.

In the absence of these conditions my experience is that one man, devoting himself to the work, can obtain more results than can committees.

At the present time employers are put to the test as to their real appreciation of the results of safety work. Assuming it necessary to reduce the working force more or less for a time, is safety work less necessary? If one of the cuts is elimination of safety work the act impels the idea among men, "This safety cannot amount to much or they would not cut it out." The work of years in reduction of accident and severity rates and of compensation paid is heavily undermined, perhaps destroyed.

This action has already been taken by some employers.

Smokers as Fire-Preventionists

SECRETARY MEREDITH of the Department of Agriculture has proposed to seven of the big tobacco companies something new in the way of an educational campaign. He suggests that printed matter be inserted in every package of tobacco urging smokers to take every precaution to prevent spread of fire from matches or burning tobacco in any form, including cigars and cigarettes.

Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

FIGHTING ICE WITH STEAM

No one who was in New York last winter has forgotten the long and trying siege of snow and ice that the city passed through. Inconvenience to the vehicular and pedestrian traffic was the most apparent phase of the experience, entailing loss to business computed in the millions. However, there was another very serious angle to the situation which was but little known to the general public. That was the danger that fires would attain serious headway, owing to frozen hydrants before the firemen could get water into play on the flames. Danger of this kind, resulting from difficulty in thawing out frozen hydrants, is to be greatly minimized this winter, if a device invented by Mr. Louis F. Ross and manufactured by The American La France Fire Engine Company proves as great a success in service as it is hoped by the New York Fire Department.

Asked what device his invention would supersede or improve upon, Mr. Ross said: "Until now there has been no device, no adequate way of dealing with frozen hydrants so as to get water into play on burning buildings without very serious delays in case of hydrants being frozen, which is very common in all Northern cities in the winter months. Many ways of thawing out frozen hydrants have been tried. Fire, boiling water and steam have been applied in many ways, but thus far the only successful means is to combat ice with steam as is done in the device I have perfected."

The Ross Hydrant Thawing Device was given its initial demonstration the other day before an interested party of fire department officials and men at the repair shop of the New York city fire department at Fifty-sixth street and Twelfth avenue. The device may be briefly described as a steam coil surrounded by a jacket tank, which is filled with water for pumping into the steam coil. The heat for generating the steam is provided by a burner directly under the coil. The burner has ten jets, the fuel used being acetylene under suitable pressure. To secure the required pressure and portability, it is necessary to use dissolved acetylene such as the Prest-O-Lite Company compresses into cylinders for auto truck and tractor lighting. In one of the accompanying pictures, a Prest-O-Lite tank is clearly shown attached to the steam generator and another

cylinder is seen near-by in readiness for connecting when the pressure in the first cylinder runs too low for effective operation of the device. This situation would occur only in demonstration where a great deal of thawing is done. In actual practice, one cylinder would be ample for opening up any number of hydrants likely to be used at any fire. The only other necessary part of the device, and this is also shown in the picture, is a connecting hose, one end of which serves as a nozzle to direct the steam jet in the thawing process. As soon as the acetylene jets are lighted, the operator begins pumping water slowly into the steam generating coil and the intense heat of the acetylene under pressure not only converts the water into steam almost instantly, but superheats the steam so that it is what is known as "dry steam," having a temperature corresponding to that of steam produced by superheaters in locomotives. As the hose gives a permanently open outlet for the steam, no safety valve is required, but one is attached as an added safeguard. Water is fed continuously into the coil, being converted into steam precisely as is the case when a drop of water falls on a red hot stove.

It will be noted that there are two operators for the device, one working the hand pump to feed water to the steam coil and the other one handling the hose in the thawing process. The blocks of ice shown are approximately twenty-four inches high and weigh about one hundred pounds each. The pictures were snapped a few seconds after the thawing was begun and a few

seconds later the ice was penetrated to the ground. Observing the progress of the hose, one was given an impression of thrusting a stick through some gently yielding or jelly-like substance.

In one of the pictures a man is seen standing on the rear of a truck to which two uprights

have been fastened with rope. These uprights are really hydrant pipes some five or six feet in length and as many inches in diameter. They were artificially frozen for this demonstration. Owing to some trick of the light, the hose is not completely shown, but it was held in the hands of the operator and thrust slowly from top to bottom of the hydrant in exactly twenty-five seconds, thus demonstrating how easy it would be to open a frozen hydrant in emergency at a fire.

The witnesses to the demonstration were very much impressed and it is likely that this device will be one of the strange new features of fire fighting apparatus that will be seen in action in New York this winter.

CONDULETS

We are in receipt of Bulletin No. 1000R issued by the Crouse-Hinds Company of Syracuse under date of November 26, 1920, and descriptive of types UNJ, ET, EY and ELB. One interesting illustration shows the manner in which these condulets are used in concrete columns, a use which is being rapidly increased on account of the great popularity of this type of construction. Those who have not received this bulletin should send for it in order to keep their condulet data up to date.

"THERE IS NO SUBSTITUTE FOR SAFETY"

The above was the sentiment of the Christmas card sent out by the Stonehouse Steel Sign Company and accompanying this Christmas card was a letter signed by J. W. Stonehouse and in his best form. The subject of the letter was the value of advertising and the part played in an advertising campaign by safety signs. Mr. Stonehouse traces advertising from the day that Eve "sold" Adam on the subject of apple-eating, and seems to have very correct ideas on publicity in general.

ANTISEPTIC OIL OF SALT

We are in receipt of a new batch of testimonials from the C. A. Mosso Laboratories. This time including three very interesting ones from members of the medical profession written in all the technical language which usually characterizes medical discussions.

Those who have never read the testimonial letters received by this manufacturer should read some of the evidence submitted by those who have used its product.

BOSTWICK STEEL LATH

The 1920 edition of the catalog of the Bostwick Steel Lath Company of Niles, Ohio, is at hand and certainly conforms to the methods of labor saving reference. The book is tab-indexed on the margin for easy reference to the several subjects. The size of the book conforms to the standard of the American Institute of Architects and to complete the convenience of its filing it is placed in a regulation file folder ready for placing in the drawer. The subject matter is devoted to the fire resistive and economical advantages of this material.

NEW YORK STATE INDUSTRIAL CODE

The New York State Industrial Code for 1920 has been issued under the direction of the Industrial Commission, and constitutes a fully indexed book of 248 pages. This industrial code is supplementary to the labor law and has been compiled in the course of seven years by the State Industrial Board and its successors, the State Industrial Commission. The industrial code has the force and effect of law and is enforceable in the same manner as the labor law. The rules cover such widely varied subjects as stairways, the storage of combustible material, fire escapes, window cleaning, fire drills, lighting, sprinklers, elevators, etc. Rules relating to these matters are applied to all factories and special rules are given for such industries as baking, building and canning and work under compressed air in tunnels, etc.

The book is very well edited and is excellent proof of the wonderfully efficient work done by the Commission.

THE DERBY ELECTRIC RELEASE

The modern industrial plant is filled with devices which normally require manual operation and which in case of emergency cannot be operated promptly enough to permit of their complete functioning.

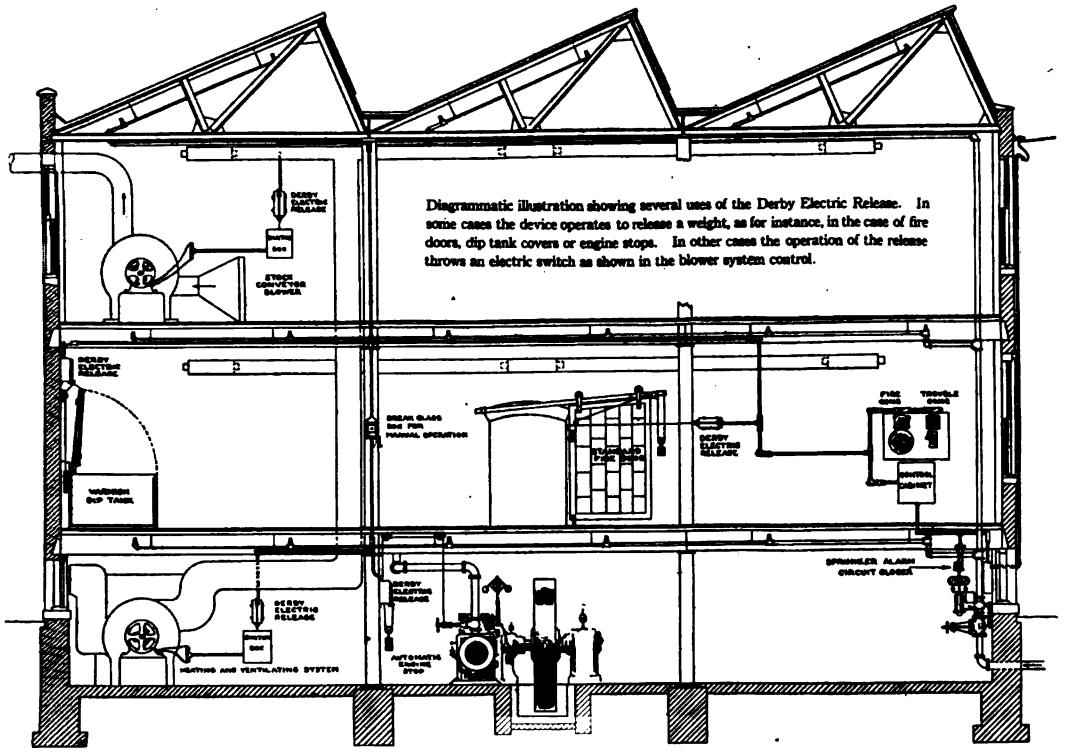
In case of fire every door and opening unless closed instantly may cause a costly spread of flames. When an oil line breaks unless the supply is shut off quickly fire will spread. Belting breaks, or a dip tank catches fire, and instantaneous operation of its protective appliance is necessary.

To provide for this service and to insure the automatic operation of these devices, the Derby Electric Release supplies remote control in a sure and simple manner.

by simply breaking the glass, in this way giving to the sprinkler system all the merits of the present dry system with none of its operating difficulties, because there is no air pressure to maintain in the dry system piping.

Where super stand-pipe protection is desired, it can be secured by means of Derby Fire Sentinels which are even more sensitive than Automatic Sprinkler Heads. This type of equipment is not automatic as far as getting water on to the fire is concerned and for that only a standard sprinkler system is to be considered. This stand-pipe system, however, with Derby Fire Sentinels, accomplishes one very important feature in that it automatically gives a prompt fire alarm.

Another important use of the Derby Electric Release is in combination with the quick-open-



Diagrammatic illustration showing several uses of the Derby Electric Release. In some cases the device operates to release a weight, as for instance, in the case of fire doors, dip tank covers or engine stops. In other cases the operation of the release throws an electric switch as shown in the blower system control.

The uses of this release are so numerous that only general applications can be mentioned. One of the principal uses of the Derby Electric Release is in connection with quick-opening valves where a supply of water or other liquid is wanted instantaneously in any system of normally dry piping. The chief fire protection use of the device in this connection is in stand-pipe hose systems, especially such systems as are used in piers, wharves, docks, unheated storehouses and other similar properties.

This, as also will be seen, is of particular value to the dry pipe system for automatic sprinklers. It may be operated by using a break-glass fire alarm which is made to function

ing valve for deluging rooms in which extra hazardous operations are performed. In these cases ordinary sprinkler heads, with struts removed, are installed, and the Derby Fire Sentinels and quick-opening valve operated with a greater sensitiveness than is possible with the ordinary automatic sprinkler.

The accompanying illustration shows control not only of sprinkler systems but the closing of fire doors, the shutting off of steam engines and the closing of varnish dip tanks, all of which are pre-eminently safety measures.

The operation of fire doors alone is of extreme importance, as experience shows that the usual fusible link does not always function

properly for three reasons. In the first place, the fire link, suspended as it is in midair, is not a sensitive device, as there is nothing about it against which heat can bank, as it does at a sprinkler head, or a Sentinel at the ceiling. The second fault is that fire doors are not tested as regularly as they should be, as it is troublesome, and inspections are neglected; and the third trouble is that even if the fusible link operates with the fire in the immediate vicinity, it is not designed to operate and close a door when a fire occurs in some place fairly remote from the door, and yet when the open door will cause fire stimulating draft and permit smoke damage.

The Derby Electric Release in combination with the Derby Fire Sentinel System maintains complete control of the valves, shutting off the steam supply in case of a blow-out in the pipe line. In the same way it will control pipe lines containing ammonia, acids, and other dangerous liquids.

The Release is used as an engine stop through manual switches and in this way is adapted to not only engines, but blowers, conveyors and a variety of moving machinery.

Another very valuable operation is the automatic closing of dip tanks in case of fire, the smothering of flame by such measure being much more effective than other methods, because water serves not to put out the fire but to spread the burning liquid.

All of this is fully described in a new brochure recently issued by the Grinnell Company, which is marketing this system, and furnishing necessary engineering advice in connection with its installation.

DESCRIPTION OF PARTS OF DERBY RELEASE BOX

"A" is a Case approximately 4 x 4 x 9" containing a Bakelite Switch Block. The Case A is provided with two ears for attaching the Cover Plate B by means of a brass pin which is held in place by two cotter pins. The inside of the Cover Plate B is provided with projections or bearings for mounting the Levers D and E and the Latch F, to which the Armature G is attached. Also these projections are used to secure the magnet coils. J are two brass screws which pass through the Cover Plate B, engaging threaded holes in the Case A for the purpose of securing the Cover Plate to the Case A and providing an easy means of inspecting the working parts of the Release when desired. K are two holes in projections from the Case A for attaching the Release to walls or columns. M are three point bronze pins supporting Levers C, D and E. These are held in place by Cotter pins. O is a felt Gasket for the purpose of preventing dust, dirt and moisture from affecting the mechanism of the Release. P is a projection on the Lever C to engage enameled iron ring to which a Sampson Sash Cord or flexible wire cable is attached. R is a tapped hole for ½ inch conduit which occurs on each end of the Release.

APPOINTS EASTERN DISTRIBUTOR

The Oxweld Acetylene Company announces the appointment of the Standard Supply & Equipment Company of New York and Philadelphia as eastern sales agent for Eveready welding and cutting apparatus and supplies.

The Standard Supply & Equipment Company deals in shelf and heavy hardware, machinery, mill and mine supplies, automobile accessories, etc., and has, besides its New York and Philadelphia establishments, branch houses in New Haven, Hartford, Springfield, Worcester, Pittsburgh, Trenton and Altoona.

The company has appointed as manager of its welding and cutting equipment department Mr. George E. Temple, for six years connected with the Prest-O-Lite Company, which formerly manufactured and marketed the apparatus now everywhere known as "Eveready."

KING'S "FOURTEEN POINTS"

Among the attractive pieces of printed matter distributed by the Julius King Optical Company is a folder entitled "Fourteen Points of the League of Safety Last." The author of these points is W. L. Fursman and if you haven't read them you should send to the Julius King Optical Company for your copy.

THE FOAMITE FIREFOAM HOUSE ORGAN

The December number of the *Industrial Fire Chief*, published by the Foamite Firefoam Company, features in colors the "Allweather" qualities of the 2½ gallon fire extinguisher, one most effective illustration being the operation of their extinguisher from the interior of a cake of ice in which it is solidly frozen.

UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

ALARM CHECK VALVE, MODEL "E"—Globe Automatic Sprinkler Co., Mfr., 2019-35 Washington Ave., Philadelphia, Pa.

CARTRIDGE ENCLOSED FUSES—RENEWABLE—Chase-Shawmut Co., Mfr., Newburyport, Mass.

CARTRIDGE ENCLOSED FUSES—NON-RENEWABLE—Chelten Electric Co., The, Submittor, 4859-65 Stenton Ave., Philadelphia, Pa.

CARTRIDGE ENCLOSED FUSES—RENEWABLE TYPE—Monarch Refillable Fuse Co., Mfr., Jamestown, N. Y.

CARTRIDGE FUSE CUTOUT BASES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

CONDUIT BOXES—Appleton Electric Co., Mfr., Wellington and Paulina Sts., Chicago, Ill.

CONDUIT BOXES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Il.

CONDUIT BOXES—Sprague Electric Works of General Electric Co., Mfr., 527 West 34th St., New York, N. Y.

ELECTROLYTIC OXYGEN—Swift & Company, Mfr., Union Stock Yards, Chicago, Ill.

ENCLOSED SWITCH—Brown & Pengilly, Mfr., 607 E. Fourth St., Los Angeles, Calif.

FITTINGS FOR CONDUIT BOXES—COVERS—Appleton Electric Co., Mfr., Wellington and Paulina Sts., Chicago, Ill.

FIXTURE FITTINGS—Butler Electric Co., Mfr., 3531 Cottage Grove Ave., Chicago, Ill.

FIXTURE WIRE—Rome Wire Co., Mfr., Diamond Branch, Buffalo, N. Y.

FLEXIBLE CORD—Rome Wire Co., Mfr., Diamond Branch, Buffalo, N. Y.

GASOLENE HOSE—Canadian Consolidated Rubber Co., Ltd., Mfr., Montreal, Can.

GAS PRODUCER—Smith Gas Engineering Co., The, Mfr., Dayton, O.

PANELBOARDS—Garvin & Co., Sam, Mfr., 5124 W. Lake St., Chicago, Ill.

PICTURE MACHINE APPLIANCE—FILM REWINDER—Fulton Co., E. E., Mfr., 3258 Carroll Ave., Chicago, Ill.

PLUG FUSES—Chelten Elec. Co., The, Submittor, 4859-65 Stenton Ave., Philadelphia, Pa.

PLUG FUSES—RENEWABLE—Economy Fuse & Mfg. Co., Greenview Ave. and Diversey Pkway., Chicago, Ill.

PLUG FUSE CUTOUT BASES—Mesa, Fernando C., Mfr., Irvington, N. J.

PROTECTORS—Reliable Elec. Co., Mfr., 3145 Carroll Ave., Chicago, Il.

PUSH FLUSH SWITCHES—Cutler-Hammer Mfg. Co., The, Mfr., Milwaukee, Wis.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—American Electrical Heater Co., Mfr., Woodward and Burroughs Aves., Detroit, Mich.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Chelten Electric Co., Mfr., 4859-65 Stenton Ave., Philadelphia, Pa.

RECTIFIERS—Electric Products Co., Mfr., Clarkstone Rd. and Nickel Plate R. R., Cleveland, Ohio.

RUBBER-COVERED WIRE—Rome Wire Co., Mfr., Diamond Branch, Buffalo, N. Y.

SERVICE ENTRANCE OUTLET BUSHINGS—Appleton Electric Co., Mfr., Wellington and Paulina Sts., Chicago, Ill.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Bartholomew & Co., Mfr., Michigan City, Ind.

SWITCH BOXES AND COVERS—Appleton Electric Co., Mfr., Wellington and Paulina Sts., Chicago, Ill

SIGNAL APPLIANCES, MISCELLANEOUS—Measuregraph Co., The, Mfr., 1819 Olive St., St. Louis, Mo.

VAPOR-PROOF FIXTURES—Appleton Electric Co., Mfr., Wellington and Paulina Sts., Chicago, Ill.

AIR HEATERS—Edison Electric Appliance Co., Inc., Mfr., 5660 W. Taylor St., Chicago, Ill.

ANTI-SLIP TREADS—American Abrasive Metals Co., Mfr., 50 Church St., New York, N. Y.

ARMORED CABLE—Pollack Conduit Co., Inc., Mfr., 467 Greenwich St., New York, N. Y.

BUSHINGS—Adapti Company, The, Mfr., Cleveland, Ohio.

CABINETS AND CUTOUT BOXES—SHEET METAL—Electric Motor & Engineering Co., The, Mfr., 2nd St., S. W. & B. & O. R. R., Canton, O.

CABINETS AND CUTOUT BOXES—SHEET METAL—Federal Steel Products Co., Mfr., 197 Frelinghuysen Ave., Newark, N. J.

CABINETS AND CUTOUT BOXES—SHEET METAL—Laganke Electrical Co., Mfr., 6969 Aetna Rd., Cleveland, O.

CABINETS AND CUTOUT BOXES—SHEET METAL—Riggs, Distler & Stringer, Inc., Mfr., 216 N. Calvert St., Baltimore, Md.

CARTRIDGE FUSES — NON-RENEWABLE — Bussmann Mfg. Co., Mfr., 3819 N. 23rd St., St. Louis, Mo.

CARTRIDGE FUSE CUTOUT BOXES—Multi Electrical Mfg. Co., Mfr., 703 Fulton St., Chicago, Ill.

CARTRIDGE FUSES — RENEWABLE —Pierce Fuse Corp., Mfr., 752 Main St., Buffalo, N. Y.

CHEMICAL EXTINGUISHER, 2½ GAL. ANTI-FREEZE TYPE—Foamite Firefoam Co., Submittor, 200 Fifth Ave., New York, N. Y.

CHEMICAL EXTINGUISHER, 1 QT. PUMP TYPE—Booth-Coulter Copper & Brass Co., The, Mfr., 115-121 Sumach St., Toronto, Ontario, Can.

CHEMICAL EXTINGUISHER, 1-QT. PUMP TYPE—Globe Automatic Sprinkler Co., Submittor, 2019-2035 Washington Ave., Philadelphia, Pa.

CHEMICAL EXTINGUISHER, 2½ GAL. LOOSE STOPPLE TYPE—Pyrene Mfg. Co., of Canada, Ltd., Mfr., 118 Craig St., W., Montreal, Quebec, Can.

CLASS A BUILT-UP GRAVEL OR SLAG SURFACED ROOF COVERINGS—Standard Paint Co., The, Mfr., Woolworth Bldg., New York, N. Y.

COMBINATION SNAP SWITCHES AND FUSES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

CONDUIT BOXES—Appleton Electric Co., Mfr., 212-14 N. Jefferson St., Chicago, Ill.

CONDUIT BOXES—Clemence Brothers, Mfr., 164-166 Linden Ave., Irvington, N. J.

CONDUIT BOXES—Overbaugh Co., Cameron, Mfr., 221 W. Randolph St., Chicago, Ill.

CONDUIT BOXES—Sprague Electric Works of General Electric Co., Mfr., 527 W. 34th St., New York, N. Y.

ELEVATOR CONTROL APPLIANCES—Elevator Supplies Co., Inc., Mfr., 1515 Willow Ave., Hoboken, N. J.

EMERY WHEEL GUARD—Howe Safety Appliance Co., Mfr., 19th & D Sts., Granite City, Ill.

ENCLOSED SWITCHES—Westinghouse Electric & Mfg. Co., Mfr., Krantz Works, 160-66 Seventh St., Brooklyn, N. Y.

GASOLINE HOSE—Meyer Co., Herbert J., Mfr., 1134 Kensington Ave., Buffalo, N. Y.

GROUND CLAMPS—Chelten Electric Co., The, Mfr., 4859 Stenton Ave., Philadelphia, Pa.

INSIDE POWER-OPERATED DISCHARGE DEVICE—Milwaukee Tank Works, Mfr., Milwaukee, Wis.

INSULATED CABINET FOR MOTION PICTURE FILMS—Hull, Salmon Mfg. Co., Inc., Mfr., 1828 Wilkens Ave., Baltimore, Md.

INSULATING MATERIALS—West Virginia Pulp & Paper Co., Mfr., Pulp Products Dept., Fifth Ave., Broadway & 23rd St., New York, N. Y.

INTERNAL COMBUSTION ENGINE, ELECTRIC PLANT—Electric Auto-Lite Corporation, Mfr., Willys Light Division, Toledo, O.

KNIFE SWITCHES—Metropolitan Electric Mfg. Co., Mfr., Boulevard and 14th St., Long Island City, New York, N. Y.

LAMP CLUSTERS—Benjamin Electric Mfg. Co. of Canada, Ltd., Mfr., 11-17 Charlotte St., Toronto, Ont.

LIGHTNING RODS—Electra Lightning Rod Co., Mfr., 30 N. La Salle St., Chicago, Ill.

LIQUID HEATING APPLIANCES—Aqua Electric Heater Co., The, Mfr., 250 W. 54th St., New York, N. Y.

MEDIUM BASE RECEPTACLES—Appleton Electric Co., Mfr., Wellington and Paulina Sts., Chicago, Ill.

MEDIUM BASE RECEPTACLES—Union Electric Co., Inc., Mfr., Trenton, N. J.

MEDIUM BASE SOCKET—Union Electric Co., Inc., Mfr., Trenton, N. J.

METAL RACEWAY FITTINGS—Appleton Elec. Co., Mfr., Wellington and Paulina Sts., Chicago, Ill.

NOZZLES—Aterite Co., Inc., Mfr., 55 John St., New York, N. Y.

OUTLET BUSHINGS—Austin & Co., M. B., Mfr., 700 Jackson Blvd., Chicago, Ill.

OUTLET BUSHINGS AND FITTINGS—TEES AND ELBOWS—Otis Elevator Co., Mfr., 600 W. Jackson Blvd., Chicago, Ill.

OUTLET BUSHINGS AND FITTINGS—Thomas & Betts, The, Mfr., 63 Vesey St., New York, N. Y.

OUTSIDE POWER-OPERATED DISCHARGE DEVICE—Springfield Mfg. Co., Mfr., 900 East Monroe St., Springfield, Ill.

PANELBOARDS—Drendell Electrical & Mfg. Co., 1345 Howard St., San Francisco, Calif.

PANELBOARDS—Laganke Electrical Co., Mfr., 6969 Aetna Rd., Cleveland, O.

PENDENT SWITCHES—General Electric Co., Mfr., Schenectady, N. Y.

PLUG FUSES—Commercial Enclosed Fuse Co., Mfr., 1317 Willow Ave., Hoboken, N. J.

PLUG FUSES—Kirkman Engineering Corp., Mfr., 484 Broome St., New York, N. Y.

PORTABLE TANKS—Wayne Oil Tank & Pump Co., Mfr., Fort Wayne, Ind.

PUSH AND ROTARY FLUSH SWITCHES—General Electric Co., Mfr., Schenectady, N. Y.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Paragon Electrical Mfg. Co., Mfr., 679 Miami St., Akron, O.

REGULATING OR REDUCING VALVES, HIGH-PRESSURE GAS—Davis-Bournonville Co., The, Mfr., Jersey City, N. J.

RESPIRATOR FOR DUSTY ATMOSPHERE—Willson Goggles, Inc., Mfr., Reading, Pa.

ROLLING STEEL ELEVATOR DOOR—Moeschl-Edwards Corrugating Co., The, Mfr., Covington, Ky.

SCAFFOLDING MACHINE — Eclipse Scaffolding Co., The, Mfr., Lincoln, Neb.

SHEET METAL FIRE WINDOW MULLIONS—Western Steel Products, Ltd., Mfr., Winnipeg, Manitoba, Can.

SHEETROCK INTERIOR WALL, CEILING AND PARTITION FINISH—United States Gypsum Co., Mfr., 205 W. Monroe St., Chicago, Ill.

SIGNS—Flexlume Sign Co. of Michigan, Mfr., 44 Cherry St., Detroit, Mich.

SIGNS—McSavaney Co., Mfr., Springfield, O.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Candler Roofing Co., J. D., Mfr., 177-79 High St., Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Gabler, F. M., Mfr., 308 West 133rd St., New York, N. Y.

SURFACE SWITCHES—Cutler-Hammer Mfg. Co., The, Mfr., Milwaukee, Wis.

SWINGING, HOLLOW-METAL, VERTICAL COMMUNICATION DOOR—Central Metal Products Corp., The, Mfr., Canton, O.

TRANSFORMERS—BELL RINGING—Betts & Betts Corp., Mfr., 511 W. 42nd St., New York, N. Y.

TRANSFORMERS — BELL RINGING — Viking Electric Co., Mfr., 150-52 Chambers St., New York, N. Y.

UNDERGROUND STORAGE TANKS—Boardman Company, The, Mfr., Box 898, Oklahoma City, Okla.

UNDERGROUND STORAGE TANKS — Cross Sheet Metal Works, Mfr., 2621 Harrisburg Rd., Houston, Tex.

UNDERGROUND STORAGE TANKS—General Welding Products, Inc., Mfr., 1021 North Broadway, St. Louis, Mo.

UNDERGROUND STORAGE TANKS—Wilson & Bennett Mfg. Co., Mfr., 6532-44 So. Minard Ave., Chicago, Ill.

UNIVERSAL ALTITUDE OR TANK LEVEL GAUGE—Cleveland Appliance Co., The, Mfr., 1265 West Second St., Cleveland, O.

WINDOW WASHERS' SAFETY BELT—Whitner Safety Devices Sales Co., Mfr., 20 Vesey St., New York, N. Y.

WIRE CONNECTORS—Macbeht. R. A., Mfr., 1424 Girard St., Los Angeles, Calif.

Safety Engineering

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Argument for Daylight Saving

IT is an argument for promoting the health and preserving the lives of the people who live in cities—the great urban population—particularly those who dwell in crowded tenements, to whom one more hour of life in the sunshine is of incalculable benefit.

The action of the State of New York in repealing the Daylight Saving Law, to redeem a demagogic pledge in a party platform, drew forth a State-wide protest. City populations, especially the toilers in the industries, want daylight saving.

New York arguments apply with equal force in every other State having mills, factories, busy offices and stifling living quarters. In the agricultural States the farmer will probably continue to object to the "early dew."

Unusual Dangers, This Year, to Public Health

There never was a time in the history of the United States when the lives of our people were so greatly in danger as at this moment. We have in this added hour of sunlight one of the best possible means of raising the resistance of the human body, of killing the germs of tuberculosis and preventing the ravaging diseases so prevalent on the other side of the Atlantic.—*Royal S. Copeland, Health Commissioner of New York City.*

New York's Workers 23 to 1 in Favor of Daylight Saving

The Merchants' Association caused an open letter to be sent out to approximately 14,000 manufacturers in the City of New York, requesting them to indicate the total number of employes each such manufacturer has, the number in favor of Daylight Saving and the number who are not. Within a week 241,000 citizens voiced their opinions and their feelings on this question, and 230,000 said that they were against the repeal of Daylight Saving, with 10,000 only in favor of repeal.

The extra hour of daylight available for healthful outdoor recreation tends to improve the health of the worker. It is well known that in many industrial plants, factories and offices employes are required to work in crowded quarters, oftentimes inadequately ventilated and poorly lighted.

The fact that more working hours come during the cooler part of the day makes for more efficient work and increased production.

Daylight relieves eye-strain. In most factories and offices artificial light is used extensively. The elimination of one hour of artificial light relieves the worker from that much eye-strain.

It reduces accidents. It has been determined as a result of accurate

(*Continued on page* 82)

Training of Private Fire Brigades

By H. C. Weigley

Engineer, Department of Special Service, Hartford Fire Insurance Company

WHERE properties are distant from or without public fire department protection the responsibility for their safety in case of fire rests largely or entirely with private fire brigades. Where public protection is quickly available the private brigade can, nevertheless, render invaluable service to the city firemen through its intimate knowledge of the plant's structural conditions and special hazards. The importance, therefore, of the private fire brigade in safeguarding any plant cannot be disregarded. But, although private departments have given a splendid account of themselves, experience in this, as in all other lines, has uncovered certain weak points which may profitably be corrected. This article is written with the hope that the observations of the writer during his practical experience along these lines may prove of help to those in small or large properties who have this important work in charge.

One of the chief difficulties experienced in developing an efficient brigade is that of maintaining enthusiasm and interest on the part of the members. Experience in many plants has proven that in the method of training the men, in making drills of live interest to them, lies a real solution to the difficulty.

ORGANIZATION OF PRIVATE BRIGADES

But before taking up the subject of training a few words on the organization of the private brigade are essential. A small brigade thoroughly trained in some of the fundamentals of fire fighting is far more efficient, even though its equipment be limited, than a brigade of large numbers untaught in the essentials of the work, though having the best of equipment at its command. Fires always mean confusion, and the most capable brigade leader can direct only a limited number of men effectively; untrained men uncontrolled at a fire hinder rather than help. A brigade of from 10 to 20 men can be easily and thoroughly trained and effectively directed at a fire; where a blaze is beyond the control of this number volunteers are always available to handle outside hose streams. The writer's experience has shown that a brigade of about the size suggested gives the best results in the average plant.

The writer recently witnessed the weekly drill of a large plant's fire brigade. The organization was a large one—40 men. They responded promptly and brought with them hose reels, chemical engine, axes and a ladder. Two lines were connected to hydrants, and streams played into the air before hose was taken up and drained. Six men had handled the hose lines, the remainder standing idly by. This drill was practically identical with all which are held there. A visiting official of the company who had timed the men complimented the superintendent on the number of men responding and on the short time elapsing between the alarm and the throwing of water. To this official and to the superintendent their fire-fighting organization seemed competent and dependable, for it had numbers, equipment and ample water supply. Yet to one who has experienced the reality of fire in its many phases that brigade lacked the most important factor of all—training. Grouped around that part of the yard where the drill was held was a power station with its electrical equipment and high potential lines, valuable and dangerous to the inexperienced in its fire hazards; across from it a 3-story building from whose windows leaned a score of women employes; nearby a warehouse containing a quantity of nitric acid—three distinct and separate problems should fire occur in them. Is the training of that brigade such as to prepare them for the emergency they may some day be called upon to meet? Certainly there is room for doubt!

EFFICIENT FIRE FIGHTING

The fighting of fire is a science which

demands study of the conditions to be encountered, and then thorough training to make use of the information gained. And laying a hose line, yes, even the throwing of water, is the least, or at any rate the last, of the points to be considered. If a small fire be kindled at the center of a room and a hose stream be directed upon it from outside, it is clear that considerable water may be thrown before the small fire is struck and the flames extinguished. But if you could walk up to that same small fire with a pail of water and pour the contents on the flames, presto, the work is done—with more speed and the use of far less water. The illustration is absurdly simple and yet brings out forcibly a fundamental principle in fire fighting—that to fight fire effectively we must run it down, close in on it, get to its base. And here let us remember that efficient fire fighting means not only the quick extinguishing of the flames but a minimum water damage in so doing. It is admitted that comparatively little training is needed to teach men to handle outside hose streams, but no fire except one resulting from explosion or one having gained great headway should be fought by that method until it becomes impossible or unsafe to enter the building. But when we agree that we must close in on a fire in order to do effective work we straightway begin to realize the value and importance of training in accomplishing this object.

VENTILATION

The vital importance of training is emphasized by two outstanding obstacles to be overcome in getting at and extinguishing a fire within a building: First, the smoke and heat which to one untrained make braving them seem impossible; second, the carrying of extinguishing equipment, hose line, extinguisher or pails into the building and as close as possible to the fire. It is in overcoming these obstacles that training men how to handle themselves and then how to handle the equipment at their command proves its value.

The best trained fireman cannot make progress in a building charged with smoke and heat beyond a certain point. But fundamental in the training of any brigade should be the matter of ventilation. While it is important that draft be excluded from a fire as long as possible in order to retard its spread, that time ceases when the brigade is ready to get into service on the fire. Outlet must be given for the smoke and heat to enable men to locate the base of the fire and to get to it. Thousands of gallons of water are frequently poured into a smoke-charged building where the actual fire is small but cannot be definitely located. Therefore, study all practicable means of ventilating the buildings on your property, considering windows, skylights, roof hatches and any other vertical or horizontal openings. Then train your men how to get at these points quickly and safely in time of fire and how to effect the desired openings. Keep in mind that almost always ventilation can be secured without damage, although emergencies may require the breaking of glass, forcing of doors or the cutting of holes in roof or floors. Since heat and smoke tend to rise, advantage should be taken of the higher openings. Men should be taught how to raise a ladder quickly, the angle at which it should be placed against a building, how to climb safely, how to secure themselves to the rungs while opening windows, how to carry axes or other tools, and how to use them to best advantage. If there is any wind, ventilation should be made on the "lee" side if possible, and chemical or hose streams be brought into play from "windward." Men should be trained as hose squads, and as ladder squads, and in drills the ladder squads should practice the duties outlined above, for they, like the artillery in battle, prepare the way for actual attack on the enemy.

ATTACKING THE FIRE

The second obstacle in extinguishing a fire is that of getting the right equipment quickly into position to play upon the fire, and overcoming this obstacle offers still more varied opportunity for training—training that will pay big dividends on the efforts expended in time saved, added security for the men and decreased water damage. Much study

has been devoted by firemen to developing the best methods of handling equipment, and the knowledge of these methods is just as valuable and applicable to the small plant brigade as to the metropolitan fire department.

This phase of the work divides itself into three parts—fighting fire from inside a building, from the outside and a combination of the first two.

FIGHTING FROM INSIDE A BUILDING

Since, where practicable, a fire should first be fought from the inside of a building, let us consider this method of attack first. Chemical lines can be put into action more quickly, can be taken to more difficult locations and can be more easily handled than the more cumbersome 2½-in. line; the brigade which numbers among its equipment a chemical engine should give special attention to its use. Whether tank be on a cart or stationary in a building, there should be not less than 100 ft. of hose attached to it, and hose should be coiled on rack or in basket rather than reeled. One man can direct a chemical line, and only one man should be allowed at the nozzle; others should spread out along the line at 10 to 15 foot intervals. Each man including the first who has taken the nozzle should catch up two or three coils or loops over his shoulder, then, as line catches in going around door or post or up stairway, he has slack to pay out without having to stop to tug and haul. The same general idea can be followed in taking the heavier water line into a building. If building is more than 1 story one man should always be sent with water pail or small extinguisher to the story above or below that in which fire is burning, to watch for and extinguish any fire eating through floor or between walls. Where only one hose line is available several of the brigade should follow the line with pails or extinguishers, letting the hose stream "knock" the main part of the fire, and with their hand equipment clean up the small fires as they go. The chief point to be observed in the drills is that men be accustomed to taking the lines to any part of any building, and that they learn to use "team work" and avoid confusion.

FIGHTING FROM OUTSIDE A BUILDING

Under conditions where entering the building is impractical or unsafe and fire must be fought from the outside, streams can be played from the ground, from ladders into windows and from adjacent roofs. Man taking a line of hose up a ladder should pass line under his arm on the side from which hose is laid, letting pipe or nozzle hang over his shoulder; this leaves both hands free for climbing and the hose trailing in such a manner as not to trip him; in climbing, have him grasp the beams of the ladder, not the rungs. Teach men how to use a ladder strap so that when directing a stream from ladder through window the ladder can carry the weight of the hose. In getting lines onto roofs, in raising axes or other tools, a rope will frequently save time and strength, and all men should be taught a few serviceable knots, the clove hitch, rolling hitch, flat knot and bowline. Where a line is taken over a roof a bad kink usually occurs at roof edge, causing loss of pressure; by tying one end of rope to the hose a couple of feet below the roof line and the other to a chimney or other roof projection, hose can be caused to curve into what is known as a "goose neck," removing the kink and eliminating the loss of pressure. Where no long ladders are available, men can be taught to lash two ladders together so that desired length can be obtained; a most effective "water tower" can be obtained by lashing a play pipe attached to a hose line to the end rungs of a ladder, then raising the ladder to a point where stream can be played into an upper window, the direction and elevation of the stream being controlled by the free end of the lashing rope. With a little practice by the men any of this "rigging" can be done by them in a few moments' time.

When conditions are such that fire can advantageously be fought from both inside and outside, one squad should enter building with hand extinguishers or chemical line, a second squad make the necessary openings for ventilation, and a third squad lay a 2½-in. water line to the windows, ready to go into service if fire proves beyond control of the men

inside. Where two lines are being directed on a fire they should not be placed opposite each other, as this usually retards the escape of smoke and lessens the effectiveness of the streams; during drills train the men to lay lines to the fire at right angles to each other.

RESCUE WORK

One further feature of training must be mentioned, for it has a general appeal and interest for the men. That is rescue work. Approximately 2,500 persons lost their lives through fire during the past year, and it is safe to say that many of these lives could have been saved had those at the fire been trained how to bring out from a burning building a person overcome by smoke or trapped by fire. The writer will never forget the bitterness which was his when the chance to carry out such a rescue came to him and he failed simply because he lacked the "know how." There are two standard methods of carrying persons—one where the person is still on his feet, the other where it is necessary to remove a person who is lying on the floor unconscious. In the first case the rescuer seizes with his left hand the right wrist of the person to be carried, placing right arm through crotch or under knees, then by stooping low he can lift with his back the heaviest person with comparative ease. Where the victim is unconscious, tie the wrists with handkerchief, belt or strip torn from clothing; then with victim lying face upward, place yourself likewise face upward on top of him with his bound wrists over your head and below your chin; grasp the sides of his clothing and roll over so that you bring him onto your back; rise to the knees, then to your feet, dragging the unconscious one behind you by means of his tied wrists caught under your chin. By this method he can be taken down stairs or ladder and both hands of the rescuer are free to use. Resuscitation by either the Shafer or Sylvester method will be of practical use both in case of suffocation by smoke, gas or drowning. All of these really valuable points can be taught the men in a few drills, and the writer has yet to see the private brigade to whose members these "tricks of the trade" did not make an immediate appeal.

SUBJECTS FOR STUDY

The above paragraphs have concerned themselves almost entirely with the physical side of the drills. Hand in hand with this side of the work goes a careful analysis of the conditions affecting fire fighting in the various plant buildings. Special hazards in the plant should be studied and discussed with the men. Avoidance of the use of water or soda-acid streams on electrical equipment or dangerous chemicals; methods of extinguishing fires in dip tanks or oil and gasoline containers; buildings containing acids whose fumes are dangerous; burlap, grain or other material which water will cause to swell; dangerous structural condition, and points where rapid spread of fire is to be expected all are subjects for study and discussion. An occasional informal talk among the members is just as valuable a use of the drill time as that spent in handling equipment.

All the points thus far outlined can be incorporated into the weekly drills, taking them up one at a time until men are proficient in them. All the suggestions given will not apply to some plants, but study of your plant conditions will readily point out those features of particular value to you. When men have become familiar with this preliminary work problems can be prepared in advance by the brigade leader for specific buildings, and worked out at the drills, making use of as many of the features of training as can be applied.

SALIENT POINTS

To sum up in brief the salient points of this subject: The organization should be of such size as to permit of thorough training of all its members, and of control and direction of them during a fire. Training must be such as to prepare the men to meet successfully the unique fire problems which can be expected to arise in their property, and so given as to hold their interest and arouse enthusiasm for their brigade. Application of these principles to the drills cannot help but raise still further the standard of good work

being done by private fire departments throughout our industrial properties. For it is only a natural result that the men who have acquired a real skill in the finer points of fire fighting should no longer look upon membership in the brigade as a compulsory duty for which foreman or superintendent has selected them, but as a position which is maintained through ability and knowledge superior to that of their fellow workmen. Call it pride or "morale" or "esprit de corps," whatever you will, it is an attitude worth while cultivating in a group of men in any plant.

NOTE.—It is obviously impossible in the short space allowed to go into greater detail regarding the training features which have been outlined. The writer, however, will be glad to furnish specific information on any of these points to such readers as are interested in putting these ideas into practice.

A New Punch Press Guard

By T. W. Osgood,

Assistant Superintendent, Department of Safety, California

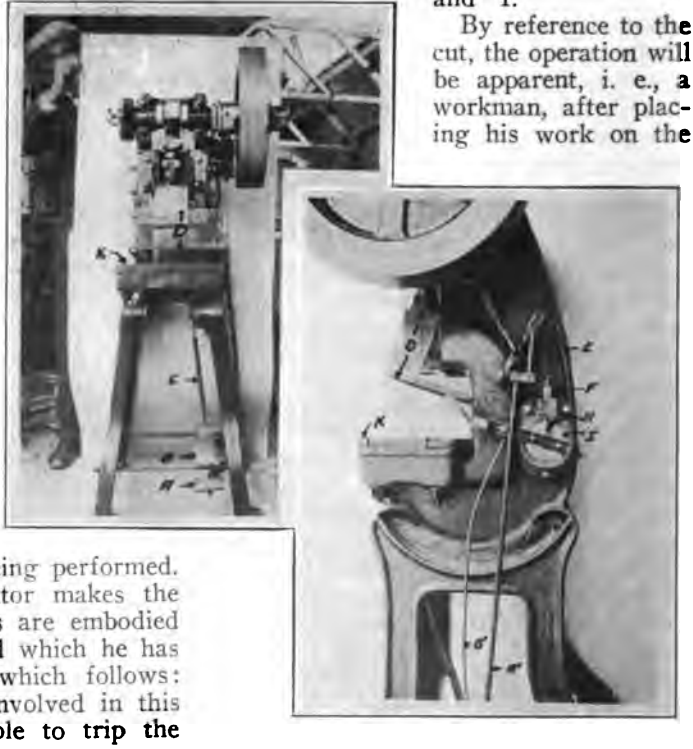
PUNCH presses have an undesirable record in the files of the California Industrial Accident Commission, they having contributed very liberally toward the maiming of workmen, especially the loss of fingers and hands.

With a view to minimizing injuries due to this cause, many different designs of guards have come onto the market and are being used with varying degrees of success, the degree in any case depending upon the adaptability of the guard to various types of presses and classes of work performed thereon.

Two features requisite to a desirable mechanical guard are: (1), that the guard provide a maximum of safety to the workman, and (2), that the guard does not seriously interfere with the work being performed.

A Los Angeles inventor makes the claim that these features are embodied in the punch-press guard which he has devised, description of which follows:

The safety principle involved in this case is that it is possible to trip the punch press only when the guard "D" is depressed so that the lower edge of same is within one-quarter inch from the bed "K" of the punch press. This operation is made positive by interlocking the punch press trip and the guard by means of the mechanism "E," "F," "H," and "I."



By reference to the cut, the operation will be apparent, i. e., a workman, after placing his work on the

bed "K," depresses the safety treadle "B" to contact with the punch trip treadle "A." By so doing, guard "D" is lowered into the safe position by means of the connecting road "B," and simultaneously the slot "H" in the disc "I" is aligned to admit the bolt "F," the only condition which will permit of tripping the press by means of connecting rod "A," and which is accomplished by depressing both treadles, which at this point are in contact with each other.

When a workman removes his foot from treadles "A" and "B" the guard is immediately raised to the off position by means of the spring "C."

The inventor's contention that the guard affords maximum safety to the workman and does not materially hamper the operation of the press appears to the writer to be well founded, and its use, wherever adaptable, may aid materially toward the desired end, that of keeping workmen's hands and fingers intact.

Dissecting a Twenty-nine-Year-Old Steel-Skeleton Building

By F. J. T. Stewart

Superintendent, New York Board of Fire Underwriters

THE work of removing the *Mail and Express* building, a steel-skeleton building, was begun about May 12, 1920, to make room for a modern fireproof building. The building formed a "T" with an entrance each on Broadway and Fulton street. The removal of the steel work and foundations has been completed, except a small section which has been left standing for the support of derricks in order to handle foundation materials for the new building. The construction of the steel-skeleton building was as follows:

CONSTRUCTION

Built 1891. Ten and one story and basement fireproof building of partly steel skeleton and partly wall bearing construction with one mezzanine in basement and one on first, also a roof structure of 4" tile, on steel framing, metal covered on outside; also a similarly constructed tower on the Broadway front of building, the upper part of which was slate and metal covered and was used as an enclosure for house and elevator hydraulic tanks. Area 6,800 square feet. Walls were brick; a portion of the south wall was party 28-16" thick to 5th, 12" and independent above; otherwise walls were independent 30-16" and 28-16" part bearing and part supported on steel skeleton. Fronts were stone, considerably carved. Finish was plaster on tile furring. Partitions were 4" tile, also few were wood. Cornices were stone. Floors were mosaic and cement finish on 10th, roof structure and most of hallways; otherwise double, 1" finish on 1" rough on 4 x 3" wooden sleepers 16" on centers, on cinder fill, on 6" segmental tile arches on part single and part twin 15" steel I beams 4' to 12' on centers (mostly 12' on centers), on 18" steel I girders 18' to 20' on centers, on part bearing walls and part built steel columns constructed of four Z bars, 3 x 6 x ½ to 3½ x 6 x ¾ and plates 9 x ½ to 9 x ¾. Roof was metal on roof structure, brick on main roof on arches and supports similar to floors. Foundations were concrete piers on sand. Fireproofing: All of the webs of beams and girders were protected by arch construction, lower flanges by 1½ to 2" of gypsum plaster blocks with straw or rattan used as binder; columns were protected in part by 4" brick and 2 to 4" tile, with enclosed space solidly filled. Ceilings were open in part in basement, otherwise were plaster on hung ceilings consisting of 1½ to 2" of

gypsum plaster block supported on 2 x 2½" double angles 3' 9" on centers.

Occupancy was general offices, retail stores and newspaper printing.

OBSERVATIONS AND CONCLUSIONS

Examinations of the steel and masonry work were made at regular intervals during removal. The condition of these materials was excellent. The only corrosion of steel was a slight pitting of a few roof beams, due probably to leaks in the roof. The steel work was painted with red lead mixed with linseed oil and except in places where the cement and masonry covering was in direct contact with the steel work, the paint was still glossy. All the steel work taken from this building is to be used again in other construction. The masonry work was in excellent condition throughout. The mortar used in the construction of the masonry work was exceptionally good.

The conditions found in this case were remarkable for their similarity with the condition of the former Gillender Building, 20 Wall street, as noted in October, 1910, at the time of its demolition. The conclusions in that report, therefore apply equally here and are as follows:

1. While some of the steel work showed slight corrosion and pitting, there was nothing to cause any special apprehension regarding the ability of such buildings to endure for an indefinite term of years. However, the presence of corrosion where the steel was exposed to the weather emphasized the importance of thorough protection against moisture.

2. A covering of cement mortar protects steel from corrosive influences better than any form of paint at present in use (the steel work in some buildings recently erected has been coated with cement mortar).

3. It is important to paint the steel both at the mill and after being erected before the cement coating is applied.

$81,162,943 for Safety, Sanitation, Pensions and Welfare

THE United States Steel Corporation, in Bulletin No. 8, published recently, estimates that in the period beginning with 1906 and ended September 30, 1920, its accident prevention work has saved 29,550 employes from serious injuries.

Every year since 1906 the accident rate per 1,000 employes has been lower than in 1906. In 1907 the rate came down 10.40%, showing the immediate results of safety engineering methods and systematic educational work.

In the first nine months of 1920 the accident rate was 54.04% less than the 1906 rate. If the remaining three months of 1920 were as favorable as the first nine months, last year was the banner twelvemonth of the United States Steel Corporation's safety organization.

In 1910 the accident rate per 1,000 employes was 43.49% under the 1906 record—a diminution not equalled again until 1915. The efficiency of 1915 was not surpassed until 1918 and 1919, each of these years showing a rate of reduction of 46.84% from the 1906 point.

A diagram of annual results shows a decline in the accident rate, comparing each year with the preceding year, in ten years; an increase in three years and no change in one year—fairly steady progress in the right direction. Less than one-half as many employes per 1,000 were being hurt in 1920 as in 1906.

A classification analyzes the causes of 220,707 accidents in the plants of the Steel Corporation since the beginning of accident prevention work in 1909. Up to September 30, 1920, more than 35,574 employes had served on safety committees, and on the date mentioned, 7,258 employes were serving on such committees. One hundred and seventeen safety engineers and supervisors devote their entire time to accident prevention and other working conditions.

Expenditures of the United States Steel Corporation, January 1, 1912, to September 30, 1920, for the purposes listed below:

Welfare	$14,011,487
Sanitation	14,724,964
Accident Prevention	7,538,241
Relief for Injured Men and the Families of Men Killed	23,662,627
The Employes' Stock Subscription Plan	11,246,859
For Pension Fund Payments in Excess of Income Provided by Permanent Fund	1,978,765
*Total Pension Payment to Employes	$5,408,597
*Additional Benefit Payments and Administration Cost	321,364
For the Creation of a Permanent Pension Fund	8,000,000
Total	$81,162,943

*Not included in total.

Below is a summary of the facilities constructed or installed for the use of employes for the purposes named, September 30, 1920:

Number of dwellings and boarding houses constructed and leased to employes at low rental rates	28,260
Churches	26
Schools	50
Clubs	19
Restaurants and lunch rooms	73
Rest and waiting rooms	260
Playgrounds	138
Swimming pools	11
Athletic fields	103
Tennis courts	105
Bandstands	20
Practical housekeeping centers	20
Piped systems for drinking water	386
Sanitary drinking fountains	3,555
Wells and springs protected against pollution	704
Comfort stations (complete units, either bath or dry houses, closets, wash or locker rooms, in separate buildings or within enclosures in the building)	1,696
Water closet bowls	7,963
Urinals	2,760
Washing faucets or basins	18,850
Showers	3,016
Clothes lockers	129,304
Base hospitals	25
Emergency stations	297
Training stations (first aid and rescue)	62
Company surgeons, physicians and internes	258
Outside surgeons (on a salary)	101
Nurses (including nurses in training)	217
Orderlies and other attendants	106
Visiting nurses	75
Teachers and instructors	215
Sanitary inspectors	30
Safety inspectors (spending entire time on work)	117
Employes who have served on safety committees	35,574
Employes now serving on safety committees	7,258
Employes who have been trained in first aid and rescue work	16,881
Employes now in training	987

Liquid Oxygen Explosives

THE U. S. Bureau of Mines has issued Technical Paper No. 243, "Development of Liquid Oxygen Explosives During the War," by George S. Rice, chief mining engineer. While in Europe in 1919, as a member of a committee to observe progress in post-war industries, Mr. Rice paid special attention to liquid-oxygen explosives. The Germans were found to have used the explosive, known as "oxyliquit," extensively in non-gaseous coal mines, in excavating subways and tunnels, in quarrying, and in iron mines, as well as for destroying French steel plants.

The experiments of the Bureau of Mines have shown that a liquid oxygen explosive can be prepared which has a

blasting strength greater than "40 per cent" straight nitroglycerin dynamite. This was shown by tests in the standard testing apparatus of the bureau, as well as in blasting.

ADVANTAGES AND DISADVANTAGES OF LIQUID OXYGEN EXPLOSIVES

The advantages, as compared with dynamite and black blasting powder, are lower cost per ton of material blasted, elimination of dangers in transportation, from premature ignition, misfires, or unexploded sticks in ore or coal, in handling and thawing, or in storage magazines.

CANNOT BE USED IN GASEOUS COAL MINES

The disadvantages are: The liquid oxygen, because of its rapid evaporation, must be used quickly after charging, thus limiting the number of shots. A liquefying plant must be maintained near the mine. The explosive can not be used in gaseous coal mines.

Its introduction into mines is difficult, because miners are not accustomed to it. The method offers great possibilities for lessening blasting costs in non-gaseous coal mines, and in metal and mineral mines using a chamber method where few shots are fired at one time.

Advantages of Proper Bathing for Workers

By J. Leonard Mason

Safety Engineer, Sun Shipbuilding Company, Chester, Pa.

THE majority of plants, including great department stores, factories and office buildings, have modern bathing equipment installed.

Most employers of labor have a human interest in their employes. They want their people to be happy on the job. There may be exceptions, but the employer who does not acquire this frame of mind cannot long be successful. It is a shortsighted man or board of directors that fails to appreciate the advantages of installing the best possible bathing facilities for the employes. I say the best possible facilities because the equipment must be attractive or else it will be little used.

Strange as it may seem, the average individual does not take to bathing "like a duck to water." The delights of the refreshing bath must be thoroughly felt to have the habit fully acquired.

THE PLANT BATHING EQUIPMENT SHOULD BE MODERN

We might talk on the physical, social and moral benefits of the bath until we are exhausted, but the crowd of dusty, grimy workers will hurry out of the plant on their way home. So, I say that first of all the plant bathing equipment should be modern and kept in good working order; that means hot and cold water running smoothly and easily adjustable.

Some one may raise the question, "Why shouldn't the workers do their bathing in the homes?" Many of them do. But the majority leave the plant without bathing and find enough to do when they get home before supper to keep them busy and the bath is neglected.

The man or woman who has been working all day under more or less dusty, dirty conditions, perspiring freely in hot weather, is more or less uncomfortable and often irritable. It would be better for the peace and tranquillity of the home if every worker made it a part of his daily routine to bathe and change from working to street clothes before leaving the plant. Good, generous sized lockers should be provided

where street clothes can be kept during the day or working hours. Let the employe contribute a small fee toward expense and maintenance of lockers and bath room.

CLEAN BODY IS CLOSELY RELATED TO A CLEAN MIND

In our plant we have a large locker room with 2,500 lockers and 20 modern showers, also 4 long wash basins with 192 spigots, for bathing above the waist. The tub bath is impractical at the plant; it is not desirable where many people might use the same tub and it needs constant attention to keep it in order. The shower baths are sanitary, and the effect on the workers after a hard day's toil is pleasant. A clean body is closely related to a clean mind. Some men would stop shouting, "Down with everything," if they had a well regulated spray of water down their back oftener. The exception might be in case the shower was not in order and a man got the hot water when he turned on the cold.

I've seen men apply at the employment department so grimy that the examining physician hesitated to put the stethoscope on them and simply examined by distant inspection. Poor fellows; they appeared down and out. The dry skin, lustreless eye, unkempt appearance generally denote a loss of ambition or any sense of self-confidence. That's the man we want to clean up, body and mind, and turn out a good American workman.

BATHING IN THE "LABOR BARRACKS"

Our company maintains a labor barracks where men who have "no regular place to call home" may board. This naturally brings together all kinds of people. These men are quite regular in their bathing, and if inclined to be neglectful their fellow boarders see that they are reminded.

The "Barracks" has its own shower—bathroom and set tubs for washing clothing. Most of the men scrub their own underwear and working clothes.

We are all more or less familiar with labor conditions and labor problems, also the experiments which have been used to find solution for these problems. Various welfare schemes have been tried. The conclusion which some of us have arrived at is this: That the best policy is to emphasize the things which add to, or give a man, self-respect. Give him ambition and a sense of amounting to something among his fellow men. No dirty, filthy being can have any self-respect nor does he gain any respect from others.

"Get Clean and Stay Clean" is our motto. The dirt of honest toil acquired during the day is the sign of a real man, but if allowed to remain there, clogging the pores, that individual begins not only to look dirty but he will think dirty, talk dirty, and act dirty. Nobody wants him around.

THE WISE EMPLOYER WANTS "CLEAN CLASS" EMPLOYES

There is too much talk of class distinction. It does not make any difference what job a man holds, it's the kind of man he is that denotes his status in society. Is he in the clean or the unclean class? The wise employer will want his employes to be in the clean class. He knows that, from the standpoint of production, those who take care of their health can and will do better work than those who neglect it. He does not make the mistake of saying: "It's up to the people who work in the plant to have sense enough to take care of themselves in personal matters." No, the wise employer and board of directors will say: "This business is run on a co-operative plan. We will not do anything which tends to take away from any man's individuality by doing the things which he should do for himself, but we will go fifty-fifty with our men in providing a safe shop, a clean shop, and reasonable facilities for personal comfort throughout the plant." Add to this a fair wage for a fair day's work and you have a good American labor policy.

Bathing is a matter of education; many a bath tub is used for a coal bin. Popularize bathing; get a good, live leader to advertise the advantages of the shower bath, spreading the information that "It makes you strong." "Bathe and be healthy." "Use the showers and be an athlete."

Some of every plant's workers will bathe at home, others will use public

baths if available, or Y. M. C. A.'s or athletic clubs. But besides this, bathing facilities should be a part of every industrial plant equipment.

THE TIME FOR THE BATH IS RIGHT AFTER WORK

The time for the bath is when you need it—right after work. It's a matter of health, hence a matter of production. So I would say to the captains and all other officers in the industrial army: Don't neglect to put in shower baths in your plant; put in swimming pools by all means if you can; then keep them up to best working efficiency and advertise the value of their use, as you advertise the products of your plant.

Coal Mining Accidents in the State of Washington

From the Official Report on the Coal Mining Industry of the State in 1920

THE legislature of 1919 supplemented the mining code, when there was created, in addition to safe place and safety device standards, an educational provision containing a series of educational rules and requirements for the training of employers and workmen to become not only artisans of trade but also of safety. For the promulgation of these educational standards the law provided for the appointment of a State mining board to consist of two members; one to be selected by and represent the coal operators and the other to be selected by and represent the workmen employed in the coal mining industry. This board was organized on September 2, 1919. The mining board was in session practically every day until the coal mining standards were completed and put into effect. Following a series of public hearings, at which employers and workmen were represented the mining board promulgated a set of educational coal mining safety standards predicated on the lofty principle of joint administration and co-operation of employer and workman in the coal mining industry.

EDUCATING OPERATORS AND OPERATIVES

Other requirements were the selection of mine safety committees, establishment of bulletin board service, distribution of literature on accident prevention, together with a systematic training of the operators and operatives in the science of preventing the needless sacrifice of human life that is being annually exacted by preventable accidents.

These educational provisions went into effect January 1, 1920, and were successfully enforced. The State Safety Board has zealously co-operated in the promulgation as well as the enforcement of the educational standards. Members of the State Safety Board, joining with the Mine Inspection Department, held a series of mass meetings in practically all of the mining communities of the State, with a view to arousing the interest of

TABLE I—Coal Mine Accidents in the State of Washington for Five-Year Period

Year	Number of Employes	Production, Tons	Number of Days Worked	Fatal Accidents	Number Killed Per 1,000 Employed	Non-Fatal Accidents	Days' Disability	Average Disability
1916....	4,727	3,018,600	1,035,546	21	4.42	902	23,840	25.9
1917....	5,345	4,002,759	1,448,253	30	5.61	1,116	28,574	25.6
1918....	5,847	4,128,424	1,556,895	34	5.81	788	22,617	28.7
1919....	5,005	3,059,580	1,169,613	19	3.79	694	25,736	37.1
1920....	4,770	*3,500,000	*1,260,000	18	3.75	502	22,023	43.9

*Estimated.

the operators and coal miners in accident prevention work. Special mining films, dealing with the principal hazards of the coal mining industry, were secured from the Bureau of Mines and exhibited in connection with illustrated lectures on accident prevention. The State Safety Board defrayed the expenses of the lectures as well as the publication of the pamphlets containing the educational standards, together with a series of mining bulletins, etc.

Table I shows the average number of men employed in and around the coal mines of the State, average number of tons of coal mined, together with the accident experience record for a five-year period, 1916 to 1920, inclusive.

claims, representing a total of 12,371 work days lost, or an average of 111.5, days per accident. Hence we had a decrease in frequency and an increase in severity.

During the five-year period we had a total of 3,902 non-fatal accidents, or an average of 780.4 per year. The year 1917 shows the heaviest increase in frequency. Hypothetically speaking this can be accounted for largely through the employment of many new and inexperienced mine workers to replace those who either enlisted or were inducted into military service.

In summing up the total disability for the five-year period the record shows that we had 122,790 days of disability, or an

TABLE II—Fatalities for Ten-Year Period in Principal Coal Producing Countries

Year	United States	Great Britain	Germany	Japan	France	Belgium	India	Austria	New South Wales
1901...	1,549	1,075	956	180	198	157	58	84	17
1902...	1,895	1,005	818	135	180	144	59	72	105
1903...	1,752	1,048	826	215	170	159	67	49	13
1904...	2,004	1,034	808	189	184	129	55	61	12
1905...	2,232	1,138	840	256	182	123	58	96	24
1906...	2,116	1,116	924	560	1,280	132	80	70	21
1907...	3,197	1,216	1,206	468	202	147	89	75	17
1908...	2,449	1,285	1,490	245	186	155	164	59	21
1909...	2,668	1,424	1,164	535	223	136	119	75	14
1910...	2,840	1,754	1,140	307	213	136	160	65	21
Avge.									
1901-10	2,270	1,210	1,017	309	302	142	91	71	27
1911...	2,719	1,232	1,176	...	...	165	148	88	15

DECREASE IN FREQUENCY, INCREASE IN SEVERITY

It will be observed that there was a substantial reduction in the fatal and non-fatal accidents in the coal mines of the State in the past two years—especially is this true of the fatalities. While a less number of men were employed during 1920 the production and the days of labor performed were much higher than the previous year, which would increase the exposure to hazard per man days worked. Under the classification of total and average disability there were fewer fatal and non-fatal accidents last year than in any one of the four preceding years. For example the temporary total disability shows 391 claims representing a total of 9,652 work days lost, or an average of 24.7 days per claim. Permanent partial disability shows 111

average of 24,558 days per year.

While we have had 18 fatalities charged to the coal mining industry for the year 1920 in reality only 15 occurred in the actual operation of our coal mines; the other three lives were lost in the Black Diamond catastrophe, while experimenting with mine rescue apparatuses in an abandoned slope, on July 10, 1920.

COAL MINE ACCIDENTS IN THE PRINCIPAL COAL PRODUCING COUNTRIES FOR A TEN-YEAR PERIOD FROM 1901 TO 1911

According to the tabulated reports on world coal mining accidents, the United States has had twice as many fatalities with but one-half the number of men employed in the production of coal, as Great Britain and Germany combined. The correlated information shows that from

1839 to 1914 there were killed in the mines of the United States 50,378 workmen. This number may not be complete inasmuch as coal was being mined quite extensively in a number of States prior to the creation of State inspection bureaus, consequently no authentic statistical information can be secured on mining accidents prior to the above mentioned time.

FALL OF ROOF

The principal factor in the accidents was the fall of roof; 23,263 men were killed by the fall of rock or coal near the working place. The fatalities due to this principal cause varied but nine points from 1870 to 1913 per 1,000 men engaged in the industry. Accidents from this cause can be prevented provided the management and workmen will strictly observe all mine safety rules and practices regarding proper timbering.

COMPARATIVE FATALITIES, BY COUNTRIES

Table II shows the number of fatalities that occurred in and about the coal mines of the principal coal producing countries for a ten-year period. It will be noted that there were more persons killed by coal mine accidents in the United States than in Great Britain and Germany combined, although the number of fatalities in itself does not show the relative hazard of the coal mining industry in the different countries.

Table III shows the average number of men employed in and around the mines of the principal coal producing countries, together with the average number killed.

TABLE III—Average Number Employed and Killed in Principal Coal Producing Countries

Countries	Average No. Employed	Average No. Killed
United States	607,438	2,270
Great Britain	890,434	1,210
Germany	482,132	1,017
Japan	105,924	309
France	178,749	302
Belgium	139,597	142
India	94,346	91
Austria	68,288	71
New South Wales	15,252	27

Table IV gives the average number killed per 1,000 employed for a ten-year period.

TABLE IV—Average Number Killed Per 1,000 Employed for Ten-Year Period

Countries	Average Number Killed Per 1,000 Employed
United States	3.74
Japan	2.92
Germany	2.11
New South Wales	1.74
France	1.69
Great Britain	1.36
Austria	1.04
Belgium	1.02
India	0.96

Real Data for Safe Construction

THE Underwriters' Laboratories has published a volume of nearly 400 pages on "Fire Tests of Building Columns." The test work was conducted by the Associated Factory Mutual Fire Insurance Companies, the National Board of Fire Underwriters and the National Bureau of Standards and lasted four years. The data it contains will prove invaluable in advancing the cause of fire resistive construction. The investigation, the only one of its kind ever made in America, was undertaken to obtain information on which proper requirements for the more general types of columns and protective coverings could be based.

In this book are chronicled the results of fire tests on 91 columns and fire and water tests on 16 columns, all under load. Besides unprotected structural steel, cast iron, concrete filled pipe and timber columns, the same types both partly and completely protected by concrete, hollow tile, brick, gypsum block, and metal lath and plaster were included to make the series representative of columns as used in building construction. The results with the data included in the report are a real contribution to building science.

Industrial Painting

[SAFETY ENGINEERING *has received a number of letters on this interesting subject. The writers discuss color schemes from various points of view—accident reduction, sanitation, lighting, morale, fatigue, distinctive appearance of various units, identification of pipe lines, prevention of eye strain, accelerated production, minimized spoilage and other angles.*]

IN hospitals everything is painted white, primarily for sanitation; in the operating rooms, for greater precaution. Why not apply this principle to mills and factories?

Danger lurks in darkness, gloomy corners and black machinery. Light colored paint on machinery brightens the dark corners and brings out in relief the finer pieces of mechanism, thus easing the strain on the operator's eyes and reducing to a minimum spoilage and accidents.

Light colors are the natural enemies of dirt. A man will give more and better care to a light-colored machine than to a black one, and will see that it stays clean, free from excess oil and dirt and, consequently, in perfect working order for a much longer period.

Consciously or unconsciously, the normal man seeks light and sunshine in his daily work. If he cannot have these, depression results. In addition to painting machines a light color, it is, therefore, of importance to paint the walls and ceilings a white or some light color, with possibly a darker colored paint for the dado, in order to prolong and multiply the amount of daylight within the plant, thereby increasing the productiveness of employes, and lessening the liability of mistakes and accidents.

In many plants operators are obliged to work at some distance from the windows; consequently, at certain periods of the day they are in semi-darkness. In such circumstances, eye strain develops, things cannot be seen clearly, and a very noticeable decrease in production and efficiency results, and the morale of the workers is impaired. Keep up the morale of a plant and production is kept up.

In mills and factories it is also of importance to know where various pipe lines go, and for what purpose they are used, so that in case of necessity their repair can be made with a minimum of lost time and effort, and without disturbing adjacent lines. In order to make these pipe lines readily distinguishable, it is the custom in many plants to paint steam, water, fire, gas, sprinkler pipes and other lines, a distinctive color.

Another factor which should be given consideration is the advisability of giving the exterior of the factory buildings a distinctive appearance by the adoption of certain standard colors for the various units. Buildings thus painted are cheaper to maintain, because fewer colors are required than if each building is painted according to the whim or fancy of the superintendent in charge of that particular unit, because by selecting fewer colors, less waste will result, and the buildings will present a harmonious appearance.

IN December, when daylight is scarce, there are twice as many industrial accidents as in June, when the days are longer, plainly indicated in the charts showing the seasonal distribution of all industrial accidents caused by inadequate lighting. Statistics show that 500,000 avoidable industrial accidents occur every year, and 125,000 of these, 450 a day, are due to poor light.

All superintendents and foremen have seen how fatigue, carelessness and accidents increase among their workmen as light grows dimmer. In buildings where light is imperfect, workmen constantly strain their eyes. Workmen must bulge the lenses of their eyes to see clearly. That means continuous nervous strain and unnecessary fatigue.

"Fatigue," says Dr. Harrington of the Massachusetts Industrial Board, "comes on more quickly from eye strain than from any amount of muscular work." In factories, stores, offices, in fact,

everywhere, workmen are laboring where lighting conditions are far from perfect. Knowledge of this, fortunately, is being acquired rapidly by managers of industries, with the result that the majority of up-to-date factories are painted white on the inside. In this connection, even advertisers of lighting fixtures are realizing the importance of paint to augment the efficiency of artificial lighting system. They are featuring the necessity of painting as well as the necessity of good artificial lighting.

According to the Electrical Testing Laboratories, New York. the surface of a pure white glossy paint increases lighting 19 to 36 per cent. Of course, this varies greatly and is entirely dependent upon the conditions of walls and ceiling before any paint is applied. For example, where there is no paint on the wall and little light admitted the application of white paint will probably increase lighting close to 50 per cent. On the other hand where the room is fairly well lighted at first, the paint will improve conditions to a much smaller degree. The Illuminating Engineering Society claims that at least one-half and sometimes practically all of the light utilized in interiors is reflected from ceiling and walls.

There is no doubt that workers appreciate good daylight. It melts up trouble and discontent, does away with the number of "seconds," and lastly improves to a remarkable extent the amount of good work that can be turned out by each ordinary workman. Daylight is the cheapest light—why not get the most out of it?

I NOTICE that a recent writer in SAFETY ENGINEERING (a contributor to The Man on the Job section) said:

"Ceilings and walls may be painted white or whitewashed. The lower 6 feet of the walls may be painted black. If the entire walls were painted a light color the lower portion would soon have a poor appearance."

In my opinion, a gray or a light drab would be more satisfactory for this purpose, as black absorbs light, whereas a light gray or drab would not absorb one-tenth as much light.

Regarding the same writer's suggestion for pipe line enamels, I think if he would follow out the chart of the Society of Mechanical Engineers, he would find this most satisfactory.

Lessons for Many Employers

IN many plants accidents occur, fatal or otherwise, from a variety of causes, somewhat similar to those enumerated below, namely, piling material so it can topple over, tolerating slippery and otherwise unstable runways for wheelbarrows, unsupervised loading or unloading of material that is liable to "avalanche," etc.:

In December one workman was killed and another seriously injured when about 30 sheets of copper on the ground floor of a building occupied by the Baltimore Copper Smelting & Rolling Company toppled over, pinning them beneath.

In December a young ranchman in New Mexico was almost instantly killed while working at the warehouse of the Nobles Brothers Company, near Texico, when nearly a carload of sugar fell on him. He was helping unload the car.

In December another young man was almost instantly killed when he was crushed by a bank caving in while he was working in a 15-foot pit laying a new cement form for a dam being built at Harris pond, North Leominster, Mass. Seven other men working in the pit escaped.

In November three men were buried beneath a shower of gravel in the Coleman gravel pit, Lynn, Mass., two escaping serious injury and the third receiving a broken leg. The men were working at the stone crusher and had started bonfires to loosen the frozen gravel when, without warning, the overhanging rock, dirt and gravel gave way, burying the men as it fell.

In November an employe of a box factory in Corning, Cal., was accidentally killed while handling blocks. He was pushing a wheelbarrow load of blocks and in some way his foot slipped and he fell about 8 feet, the wheelbarrow with him. The handle of the wheelbarrow struck in such a way as to crush the ribs into the heart.

EDITORIAL

SAFETY IN THE PULPIT

ON a recent Sunday the service of the First Universalist Church in Canton, Mass., was conducted entirely by laymen, the sermon being preached by Mr. J. Albert Robinson, superintendent of the inspection and service department of the Grinnell Company, Inc., and a director of the American Society of Safety Engineers. His subject was "Am I My Brother's Keeper?"

After presenting statistics to show the enormous loss of life, suffering and destruction caused by careless accidents and the appalling fire waste, he traced the economic and religious significance of the "Safety First" movement.

"Safety practices and safety thoughts should start in the home and be consistently lived in the home life," he said. The first safety speech recorded is the brief prayer lisped by the little child, "God bless Papa and Mamma." Mr. Robinson pleaded for the installation of automatic sprinklers in schools and tenement houses, and said that the security of our families at home and our children in schools would be enhanced by better construction and fire-safe first floors.

Mr. Robinson closed by saying: "All classes of men within this great Democracy must learn to appreciate and work together in various groups for the common welfare. The national safety movement exemplifies this principle and spirit. It was not given to all of us to fight for Freedom, but the fight for Safety, the fight for the real adventure, the fight for a life that shall be the measure of a purpose instead of the marred result of purposeless chance, is within the right of all of us."

HEAD AND EYE PROTECTION FOR INDUSTRIAL WORKERS*

THE work of the American Engineering Standards Committee is beginning to be apparent, the code for the protection of head and eyes having made its appearance with the imprint of the United States Bureau of Standards, which was appointed sponsor for this code.

This is the second national safety code that has been developed by the Bureau of Standards, the first complete edition of the National Electric Safety code having been published in 1916.

The arrangement of the code under review is such as to present, first, the general requirements, including a classification of the occupations which require eye protection, following these, in detail, with the requirements for each group of occupations with operating rules and specifications for tests which must be met in order to make it certain that the protectors will adequately fulfill their purpose. Only the last section of the code giving these specifications need be considered by those who must determine whether protectors are suitable for the intended purpose—that is to say, by the agencies that will determine which form of protector conforms to the code requirements. The preparation of the code is credited to Morton G. Lloyd and Charles E. Oakes of the Safety Section of the Bureau, who worked under the supervision of Edward B. Rosa. An impressive advisory committee lent its aid.

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*NATIONAL SAFETY CODE FOR THE PROTECTION OF THE HEADS AND EYES OF INDUSTRIAL WORKERS. Compiled and published by Bureau of Standards, United States Department of Commerce, Washington, 1921. 64 pages. Price 10 cents.

The complete work strikes us as being very satisfactory. It seems to be firm enough in its requirements to give the protection required, while being entirely free from insistence upon non-essentials. A very wide latitude is permitted the user in most cases and the tests imposed are of a sort that should be passed easily by all the recognized manufacturers.

The code is arranged in excellent form and is thoroughly indexed. It is sold at a price which seems to be below the cost of production. We may say that the promotion as a whole is an excellent piece of work done in a business-like way.

WHERE SAFETY AND ROMANCE MEET

THERE is always an appeal to one's love of adventure and heroism in the work of the "Coast Guard"—the mysterious glare of the Coston light on the lonely beach, the launching of the lifeboat in the heavy surf and the patient search for a reported derelict over miles of trackless sea.

The annual report of the United States Coast Guard for the year ended June 30, 1920, records in a casual and colorless way the work of this branch of the Treasury Department, but it cannot eliminate the romance nor hide in official language the courage of its personnel, which is told on every page. The pages number more than 400, and most of them bear the briefest recitals of "assistance rendered":

"Lost bearings in snowstorm and stranded; took off crew by boat."

"Sprung leak; found in sinking condition; towed to safety."

"Stranded in thick weather; took off crew with breeches buoy; gave mate's wife, who was unconscious, restorative treatment; clothing furnished by station."

"After three unsuccessful attempts, got alongside and saved 60 persons."

That is safety work with a vengeance and a combination of both public and industrial safety, for, of course, most of the rescues are of men whose work is afloat and who are "workmen" as much as though they worked in a town mill.

We don't often think of the "Coast Guard" as a safety organization, and seamen are both modest and laconic, but when the next Nor'easter blows let's give a thought to the "safety man" who is struggling along a razor-wind-blown beach or climbing a wild dune, straining both ear and eye to catch the sound of a signal gun or the sight of a distress rocket, and remember their record for one year—

2,471 lives saved or rescued from peril;
8,427 persons on board vessels assisted;
561 persons in distress cared for—to say nothing of thousands of other "safety" acts done in their day's work.

ONE YEAR'S PROGRESS

A STUDY of the report made by H. W. Mowery on his retirement from the office of president of the American Society of Safety Engineers reveals a remarkable growth in that association during his term of office.

It must be remembered that the American Society of Safety Engineers was reorganized and that from its original beginning in 1912 up to September, 1919, the total recorded memberships were 188, of which only 44 were in good standing at the time of the reorganization. Since the reorganization 341 memberships have been paid for, showing an increase of 800 per cent in numbers, but an equal increase in membership fees, as the original society had a nominal membership fee. It is doubted whether any other engineering society has achieved so remarkable a record in so short a time.

The year's success was not confined to membership or finance, as may be seen by reference to the list of papers presented at the various meetings of the society during the year. An extremely large proportion of the papers were absolutely original, and the aim of the 1921 publication committee is to continue that policy. Too many safety meetings are marked by papers which have a familiar sound; an engineering society is expected to present original research.

Rules for Prevention of Gas Explosions in Anthracite Mines

By Joseph J. Walsh

*Inspector, Fourteenth Anthracite Inspection District, Nanticoke, Pa.**

CASUALTIES as a result of gas explosions in a coal mine are more nearly inexcusable than those occurring from almost all other causes. When one considers the means available for the purpose of ventilating a mine, and the many devices and safety appliances invented for the purpose of detecting and preventing the ignition of explosive gases, there can be only one answer in explanation of the frequency with which explosions take place in certain parts of the anthracite field of Pennsylvania.

The casualties as a result of gas explosions in the anthracite mines of Pennsylvania during the past 47 years were 1 every working day; the ratio being 1 fatal to 3 non-fatal.

Problems involving the element of human life, and particularly that problem influenced by conditions that can not at all times be foreseen, should be so guarded and surrounded by a safety factor that no element of danger can be reasonably seen by the inspector or the mine manager. In the case of a shaft rope, the factor of safety can be expressed in numbers; but where the application of the safety factor is for the purpose of preventing accidents from gas explosions, the factor can not be expressed numerically. Neither the intelligence of the workman nor the action of the elements can be measured in a way that would permit the application of a factor that one could say would act as a barrier against gas explosions under all conditions. Therefore, greater care and a more liberal application of safety devices are required to insure a factor of safety in the matter of preventing explosions than would be required if such factor were susceptible to mathematical calculation.

Probably the greatest difficulty in dealing in a general way with the matter of preventing gas explosions is to understand just what is the underlying cause of explosions in a coal mine. Many mining men, ordinarily well informed, are in doubt as to the most effective means by which they might combat the evil. This confusion seems to be brought about by statements to the effect that the miner is in complete control of the situation, that his safety is entirely in his own hands, and that if he will not exercise caution nothing can be done for him. It is true that the miner has certain statutory duties to perform, and it is also true that he sometimes violates those duties, in consequence of which explosions take place. Explosions also occur because of conditions that are entirely beyond his control.

We are told that the foreign-speaking miner is unskilled and untrained in mining affairs, as a result of which the underlying principles of the safety movement are imperilled. It is said he must be educated in order that any degree of efficiency be obtained from a well planned safety movement. While this statement is somewhat in conflict with the actual fact, education is, nevertheless, an essential element in any plan that might be adopted for the prevention of accidents. But in view of the importance of the question the educational scope should be extended to include the inspector, the mine manager and all other mine officials. A man may be highly efficient in all the technical branches of mining and at the same time be unable to recognize danger when he meets it.

UNSKILLED WORKMEN

Great things have been achieved as a result of the educational movement among the miners. Many have left the

*Proceedings of the Ninth Annual Safety Congress, National Safety Council.

ranks and are now filling official positions. Regardless of this, there will always be found in every coal mine the farmer from European countries who is unfamiliar with the customs, and who, because of being unskilled and uneducated in the matters of safety, will imperil not only his own life but the lives of others as well.

Since a chain is no stronger than its weakest link, likewise a mine will be no safer than the most careless or the most unskilled man in it if drastic precautions are not taken in matters that deeply affect its safety.

Therefore, regardless of any practicable effort that might be put forth in an educational way, there will always be unskilled workmen in every mine. This being true, no greater success in the matter of reducing the number of accidents from gas explosions will be achieved in the future than has been recorded in the past unless those who are unfamiliar with the dangers are surrounded with all the known safety devices. This duty I conceive to be a function of the State and the mine manager.

FAILURE TO DRAW DANGER LINE

The greatest impediment to the prospects of success in a safety movement seems to be our failure to draw the danger line at such time or place as would afford the highest degree of safety.

There is a group of mines in a certain part of Pennsylvania from which 457 tons of methane, or about 4,323 tons of fire-damp, are expelled each day; and during a period of 4 years more than 1,600,000 tons of coal were mined for each casualty as a result of gas explosions.

At a second group of mines bordering those mentioned, in which the same conditions prevailed and from which 390 tons of methane, or about 3,689 tons of fire-damp, were expelled daily, the production per accident from explosion of gas was slightly over 300,000 tons.

Still a third group, parallel in every respect and generating about the same volume of gas, produced slightly less than 500,000 tons of coal per accident from the same cause.

In the first group the industrial efficiency which makes it possible to obtain so large a tonnage for each accident can be attributed to the placing of proper safeguards around the workmen. For instance, safety lamps are used exclusively in a section through which 22,000 cubic feet of air is passing each minute and having a methane content of 0.26 per cent. In another section in which the methane percentage is 0.25, and the volume of air is 16,000 cubic feet, open lights are not used. In still another mine, through which a volume of 25,000 cubic feet of air passes each minute, the methane percentage is 0.14 and the only means of illumination is the safety lamp.

In the second group of mines open lights were used in an air condition containing 1.12 per cent methane; the volume of air being 28,000 cubic feet per minute.

In the third group, haulage was performed by means of trolley motors when the gas percentage was in one case 1.02 and in another 2.30, the air volumes were 12,000 and 34,000 cubic feet respectively; and thus we may go on citing such extremes in many other instances.

CHIEF CAUSES OF ACCUMULATION OF GAS IN A MINE

The chief causes of the accumulation of gas in a coal mine are:

1. An insufficient volume of air, due to a weak or improperly located ventilating fan.

2. Loss of the air through leakage before it reaches the working faces. Conditions of this kind may be found in mines where the stoppings between the intake and return airways are poorly constructed. Likewise, in cases where a mine is developed by the single entry system, a condition exists that will seriously interfere with the correct ventilating of the mine.

3. The short circuiting of the ventilating current due to a neglected door; the breaking of a brattice, and the driving of openings too far in advance of the air.

4. Under this head might be mentioned a cause for the accumulation of gas in a coal mine, that is becoming quite serious, namely, the frequent interrup-

tion of the air current on account of electrically driven fans failing to function.

IGNITION OF GAS

The ignition of gas takes place in a coal mine chiefly as a result of the use of open lights, the use of a long flame powder and the use of electricity. Smoking, defective safety lamps and the careless striking of matches are also contributing causes of gas ignition.

RULES FOR THE PREVENTION OF GAS EXPLOSIONS IN ANTHRACITE MINES

It is not my purpose to enumerate the many rules that have been published from time to time as precautions to be observed by the 130,000 miners of the anthracite field of Pennsylvania, but rather to suggest to the 128 mine managers a means by which they can eliminate to a large extent the possibility of an explosion, in case the commonly applied rules are overlooked by some member of the larger group.

1. When about to install a fan its size and location should be determined with the aid of a ventilating expert. Remember as time goes on your airways will become congested as a result of roof falls. The falls will not be cleaned up; it is not practicable in many cases. Because of this your ventilation will be impaired; to provide against which the power of your ventilating equipment should be at least three times greater than that calculated by means of the volume of air and the ventilating pressure.

2. Build all stoppings between the intake and return airways with stone, brick or concrete; this can be done regardless of the pitch of the seam.

3. Avoid the use of main doors as far as it is possible.

4. At the more gaseous mines use steam driven fans for ventilating purposes. They are more reliable than those electrically driven. It was found by an examination of the records of eight steam driven fans that they stopped, without warning, on an average of once in 16 years. Under like conditions it was found by an examination of eight electrically driven fans that they failed to function, without warning, once every 4 months. Accidents have occurred as a result of fans stopping.

5. At the moderately gaseous mines, if an electrically driven fan is operated the fan should be on an independent circuit. By the term "moderately gaseous" is meant a mine or section of a mine in which is found a gas condition such as appears in paragraph 7.

6. Have the air in each section of your mine analyzed monthly, and remember the danger lies not so much in the percentage of gas in the current as in the volume of gas generated each minute.

7. Because of the ignition of accumulations of gas by open lights, both fatal and non-fatal accidents have occurred in mines having the following air conditions:

No.	Quantity of air per minute	Per cent of methane	Methane generated per mm. c.f.
1.	10,000	0.29	29
2.	15,000	0.44	66
3.	8,000	0.52	41.6
4.	12,500	0.18	22.5
5.	8,000	0.32	25.6
6.	20,000	0.24	48
7.	11,000	0.26	28.6
8.	16,000	0.15	24
9.	8,000	0.23	18.4

With few exceptions safety lamps should be used in mines having an air condition such as indicated in the above table.

8. A mine in which the direction of the air current is controlled by doors is, under like gas conditions, more dangerous than one ventilated without the use of doors. This should be considered in the application of safeguards.

9. Use permissible explosives in all mines where danger is imminent from explosive gases.

10. A section of a mine in which 125 cubic feet of methane or more is generated each minute should be classed among the more dangerous mines. By the term "section" is meant that part of a mine defined by the anthracite mine laws, in which 75 persons are permitted to work. Such sections fully manned would comprise an area of about 10 to 12 acres actually being developed.

11. In gaseous mines electricity should be used only in the intake airways.

12. The practice of giving a miner a

safety lamp for testing purposes and at the same time permitting him to work with an open light is a dangerous custom. Gas may accumulate because of a neglected door while he is about his duties. It would be unreasonable to expect the most careful workman to avoid accidents in cases of this kind.

Unfortunately, it can not be said that explosions are things of the past; they continue to occur in spite of all the skill and care of the mine officials and the miners. It is usually the unexpected that happens; therefore, it will be found to be prudent to surround your workmen with every known device and place in their hands such means as will insure protection in case a danger should arise.

Safety News and Comment

Safety to Life in School

THE Department of Superintendence of the National Educational Association is to hold its annual meeting in Atlantic City, N. J., during the first week of March. On March 3 the Committee on Standardization of Schoolhouse Planning and Construction will hold a "round table" on the subject of "Safety to Life in Schoolhouse Planning." The program for the "round table" is appended:

SAFETY TO LIFE IN SCHOOLHOUSE PLANNING

H. W. Forster, Philadelphia, chairman, Committee on Safety to Life, National Fire Protection Association.

J. Albert Robinson, Providence, chairman, Committee on Fire Protection, American Society of Safety Engineers. Lantern Slides.

S. A. Challman, St. Paul, State Inspector of Buildings and Sanitation, Department of Education.

William George Bruce, Milwaukee, American School Board Journal.

Frank Irving Cooper, Boston, Mass., Architect.

THE COMPREHENSIVE SCHOOL BUILDING

F. E. Clerk, Winchester, Va., Superintendent of Schools, Lantern Slides.

James O. Betelle, Newark, N. J., Architect.

Dwight H. Perkins, Chicago, Architect.

William B. Ittner, St. Louis, Architect.

C. B. J. Snyder, New York, Architect, Board of Education.

Allen P. Keith, New Bedford, Mass., Superintendent of Schools.

S. O. Hartwell, St. Paul, Superintendent of Schools.

James M. Glass, Rochester, N. Y., Principal, Washington Junior High School.

Engineers' Meeting in Philadelphia

THE Philadelphia section of the American Society of Mechanical Engineers and the Philadelphia Safety Council will hold a joint meeting in Philadelphia on February 28. The program:

"The Engineering Aspects of Signalling." By A. H. Rudd, chief signal engineer, Pennsylvania system.

"Crane Overhoist Limit Stops." By D. M. Petty, electrical engineer, Bethlehem Steel Company.

"The Relation of Boiler Accessories to Safety." By Warren Hilleary, superintendent of schedule rating, Royal Indemnity Company.

"The Lubrication of Air Compressors." By Dr. A. D. Risteen, director of technical research, Travelers Insurance Company.

"Lessons from Electrical Fatalities." By S. E. Whiting, assistant chief engineer, Liberty Mutual Insurance Company.

"A Broader Field for the Engineer." By Prof. Dexter S. Kimball, engineering college, Cornell University.

"Safety, the Fundamental of All Engineering." By L. A. DeBlois, E. I. du Pont de Nemours & Co.

Artistic and Fire Resistive

THE National Terra Cotta Society has issued a handsome artistic brochure on the use of terra cotta as a building material which lends itself to very artistic designs and is extremely durable. Concerning its durability it is said: "It is the most durable building material known. It is unaffected by age or climatic change. Glazed and slip surfaces render it practically impervious to moisture, and dust

and dirt may be removed at trifling expense with dry brushes or plain water. Having been carried during process of manufacture to a temperature exceeding 2,000 degrees Fahrenheit, it is untouched by the heat of conflagration. Government requirement for interior partitions is but 1,700 degrees Fahrenheit fire test. Salvage in the Baltimore, Buffalo and San Francisco fires was not only very high and much greater than in any other exterior building material, but such damage as occurred was from mechanical cause and not from heat."

R. L. Gould, Consultant in Safety

MR. R. L. GOULD, who for some time past has been with the United States Rubber Company, New Haven, is about to open an office for the practice of safety engineering along lines that are of interest to our readers. Mr. Gould, a mechanical engineer and a member of the American Society of Safety Engineers, has been a close and analytical student of safety problems, and has proven himself most competent to perform service in this branch of engineering.

He will specialize on accident prevention and industrial betterments; make factory inspections covering water supply, ventilation, lighting, heat and sanitation; devise systems and install them, make personal inspections and render general safety engineering service on term contracts or give special consulting advice as needed.

Mr. Gould has established offices located at 104 Brownell street, New Haven, Conn.

Simonds File Company

THE Simonds File Company, Fitchburg, Mass., employs about 400 employes of both sexes. The work is the making of files and hack saw blades and includes heat treating, drop forging and file cutting. During the year 1919 there was a loss of 320 days due to accidents. In 1920 action was taken by the executives to reduce this number. As a result of the methods adopted, the total lost time in 1920 amounted to only 80 days, or a reduction of 75% over 1919.

Considering the class of work done, which in its nature is hazardous (the liability to accident and infection is great), this record is well worthy of commendation.

Sprinkler Tank Installation

THE Factory Insurance Association has issued details of a new standard sprinkler tank installation showing standard gravity tank on steel trestle, valve pit, hot water tank heater and connections required. Several changes from the previous standard have been made, therefore engineers and manufacturers who are directly interested in installations of this kind are requested to take note of the details of the new standard.

Carnegie Co.'s Safety Trophy

THE Carnegie Steel Co. has placed safety work on a competitive or sporting basis, its 13 units being the competitors for a trophy that has been offered by the company. The trophy is a bronze statuette symbolizing Safety. It stands 26 inches high and is 10 inches in diameter through the base. The trophy is the composition of Moretti of Pittsburgh, and the piece is the first attempt to symbolize safety.

The trophy was put in competition the first of 1921, and is to be awarded monthly to the plant making the best record for safety, the best percentage in a ranking report, based on the least number of accidents that cost loss of time, in proportion to the men employed. As each plant wins the trophy, it will be held by that plant for the succeeding month, the name of the plant is to be inscribed on the base, with the name of the month for which it was awarded. At the end of the year the plant that has won the trophy the greatest number of months will become the permanent holder.

The plants in competition for the trophy are the Edgar Thomson Steel Works, Braddock, Pa.; Duquesne Steel Works, Duquesne, Pa.; Homestead Steel Works, Munhall, Pa.; Clairton Steel

Works and By-Product Coke Plant, Clairton, Pa.; New Castle Steel Works, New Castle, Pa.; "Ye Olde Mills" or City Mills, those mills of the company located within the city lines of Pittsburgh; the City Furnaces, those blast furnaces within City lines; the works at Farrell and Sharon, Pa., the mills of the Youngstown District; the Columbus, Ohio, plant; the Mingo Junction, O., plant, and Bellaire, O.; and the Union Railroad.

Employers Must Heed Safety Laws

THE Industrial Commission of Wisconsin proposes to deal vigorously with violators of the safety laws. In 1920 increased compensation was recommended in nearly 30 per cent of the accident cases investigated by the Industrial Commission, according to announcement by E. E. Witte, commission secretary. There were 2,616 accidents investigated to determine whether or not employes or their dependents were entitled to increased compensation. In 757 cases reports of investigators indicated that accidents were due to violations of the safety laws. Systematic investigations of accidents to determine whether they were due to violations of the safety laws have been made by the industrial commission only during the last year. All reports upon accidents are now investigated by the safety and sanitation department of the commission as soon as they are received. If there is any question about the accident which suggests that it might have been due to a violation of law, the case is investigated by a field deputy.

Massachusetts Safety Lectures

THE Massachusetts Division of University Extension is conducting lectures with a view to protecting those who are engaged in industrial occupations. It says statistics show that in the United States during a recent year there were approximately 20,000 industrial accidents and 300,000 very serious injuries for which workmen's compensation should be expected. These figures are appalling, especially when we know that 90 per cent of these accidents were preventable. It is estimated that 40 per cent of industrial accidents occur because employes do not understand *how to use unprotected machinery.*

The course is intended to deal, in a practical way, with the following subjects, each of which is the title of a lecture: How Accidents Occur; Principles in Design and Construction of Mechanical Guards; Fire Hazards; Gasoline, Stairways, Platforms, etc.; Safety in Power Generation, Control and Transmission; Shop Equipment; Specialized Industrial Equipment; Bodily Protection; Safety Organization; Care of Injured Workmen; Housekeeping; Workmen's Compensation.

Milwaukee Wants Safety Devices

THE safety division of the Milwaukee Association of Commerce has started a novel series of safety meetings for superintendents and other manufacturing executives in Milwaukee. The principal discussions relate to the application of standard safeguards as affecting workmen's compensation insurance rates. A questionnaire has been sent to all of the 5,000 members who can possibly be interested in safety devices and compensation insurance as operative in Wisconsin.

Plagiarism Is an Unsafe Practice

WE regret that we must withdraw our congratulations to Earl Holman, to whom we referred in January as the "intelligent office boy" of the Anaconda Copper Company, at Butte, Mont. Verses bearing the title, "The Catastrophe," were published in our January issue credited to Mr. Holman's authorship. Since that time, information received has convinced us that the verses were plagiarized from the December number of *The Safety Pin,* a bright little publication conducted by H. S. Wittmaak of Erie, Pa. Young Mr. Holman's employers have expressed to Mr. Wittmaak their regret for the plagiarism and SAFETY ENGINEERING is now glad to give credit to the real author.

Frequency of Elevator Accidents

JUDGING by newspaper reports, 1921 opened disastrously in the matter of elevator accidents, which seem to be occurring, the country over, at the rate of several per day. The very incomplete list below is indicative of the large number of deaths and injuries caused by the "vertical railways." The prevention of accidents of this class is, mainly, a job for the safety engineer instead of the safety psychologist. Typical accidents in January:

FALLS IN SHAFTS

Jan. 4. Webster City, Ia. Ralph Trotter, operator, 21, fell out of door of elevator at Kamcar. Killed.

Jan. 5. Ogden, Utah. Swen Peterson, 17, fell 4 stories down shaft, Ogden Packing & Provision Co. Leg broken.

Jan. 5. Geneva, N. Y. C. H. Benedict, fell 2 stories down shaft, Standard Optical Co. Killed.

Jan. 7. Marlboro, Mass. William Dediko, operator, 20, Hudson Counter Co., plunged into shaft while looking down well to see what was wrong when car failed to run properly. Dangerous injuries.

Jan. 8. Omaha, Neb. M. Martino, 63, janitor, Armour storage house, opened door and fell 11 stories in open shaft, car being at floor above. Killed.

Jan. 10. Newark, N. J. Two employes of restaurant in Strand Theatre building stepped into open shaft, car being at upper floor. Both badly hurt.

Jan. 11. South St. Paul, Minn. T. A. Bride, member of livestock commission firm. Fell down shaft. Back and neck injured.

Jan. 11. Philadelphia. Harry Black, 42, stepped through open door into shaft. Leg broken, both arms sprained and other injuries.

Jan. 13. Lawrence, Mass. Michael Coulin, 46, fell down shaft, Diamond Spring Brewery. Badly hurt.

Jan. 14. Brooklyn, N. Y. Leonard Ludwig fell 2 stories down shaft, 42 Goodwin Place. Severly injured.

Jan. 18. Cincinnati, Ohio. Thomas Dugan fell down shaft, McGowan Pump Co. Hip and wrist injured.

Jan. 19. New York City. William O'Neill, 38, janitor, 163 E. 126th street, fell 5 stories to basement. Skull fractured.

Jan. 19. Reading, Pa. Nathan Murray, 37, fell from second story to bottom of shaft. Killed.

Jan. 24. New York City. Thomas Shippan, operator, Yale Club, fell 20 stories to bottom of shaft. Killed.

CAUGHT, CRUSHED, ETC.

Jan. 5. Middletown, Pa. W. S. Johnson, watchman, Geneva Cigar Co., caught in elevator, imprisoned for 4 hours, crushed. Fatally hurt.

Jan. 6. Sault Ste. Marie, Mich. Fred Gingress, pressman, *Evening News*. Head caught between car and well. Killed.

Jan. 10. Boston, Mass. G. S. Smith, stock keeper in a Tremont street store, tried to enter car while door was being closed. Killed.

Jan. 11. Trenton, N. J. William Alexander, Charles Hulspar and John Seegar were repairing elevator in Crossley machine shop. Car dropped 40 feet into basement. All seriously hurt.

Jan. 13. Paulsboro, N. J. Thomas Jabes, 33, employe of Thomas & Son, fertilizer manufacturers, caught in wheels of elevator. Arm torn off and injured fatally.

Jan. 13. Madisonville, Ohio. Emil Grosse, carpenter, San Elmo Cigar Co., tried to board a moving freight elevator. Killed.

Jan. 19. Brooklyn, N. Y. Manel Evamus, 29, porter, Standish Arms, Crushed while polishing grille work. Killed.

Jan. 19. Memphis, Tenn. Orvin Raney, plater, Bemis Bag Co., caught foot in automatic doors of freight elevator and was crushed. Killed.

Jan. 21. Baltimore, Md. Nelson Baity, passenger, attempted to jump when operator lost control of car. Leg crushed and other injuries. Firemen called to extricate him.

Jan. 22. Atlanta, Ga. C. D. Pursell, 36, struck on head by descending car while repairing elevator door, Grant building. Killed.

Jan. 22. Boston, Mass. Morris Wiener, chauffeur, was delivering a box 11 feet long to Henry Bros., dealers in billiard tables. He stood the box upright in elevator. Box tipped, intercepting counterweight. In the jam, Wiener's neck was broken.

Jan. 22. Albany, N. Y. William Fahey, 21, operator, Ten Eyck Hotel. Caught between elevator and shaft. Killed.

Jan. 22. New York City. Two small boys, 5 years and 7 years old, playing in a freight elevator in Ebling brewery, were crushed. Both badly injured, one reported fatally hurt.

Jan. 23. Los Angeles, Cal. Anna Stahle, janitress, caught between moving elevator and wall in office building. Killed.

Jan. 25. Marion, Ohio. William Heth, operator, Marion Packing Company, was killed instantly when he seized a cable, crossed with a high-tension wire, while working in the shaft.

AUTOMATIC ELEVATORS IN CALIFORNIA

The Industrial Accident Commission of California has issued an order requiring approved locks on automatic elevators. City officials of Los Angeles estimate that 500 elevators in that city will come under the classification. *Organized Labor*, San Francisco, says: "The absence of satisfactory interlocks on elevators has, in recent years, caused a number of accidents, among them 36 fatalities,

according to records recently compiled by the Industrial Accident Commission. In order to cope with the situation, the elevator safety orders, which provide for the installation of adequate and approved door locks, were made retroactive, so that they will cover old elevators as well as those that were installed after October 1, 1916. In fairness to all concerned, the commission has called a number of conferences of property owners, lessees and certain organizations affected by the ruling, and, as a result thereof, July 1, 1921, has been definitely agreed upon as the final date on which all automatic elevators within the State of California shall be fully provided with door locks of a type acceptable to the Industrial Accident Commission. No automatic elevator will be permitted to operate after July 1, 1921, unless equipped with acceptable door locks."

Railroad's Fine Safety Record

AN increase of 35% in the number of locomotive-miles per train service casualty and an increase of 29% in man-hours per industrial casualty during 1920 as compared with 1919, are the outstanding features of the annual report of the Northwestern Pacific Railroad Company's safety organization just made by William S. Wollner, general safety agent, to W. S. Palmer, president and general manager of that company.

Without reference to increase in train-miles and man-hours during the year, a flat decrease of 7½% was made in the number of casualties to employes. As the railroad company's force during 1920 was considerably larger than during the preceding year, this record represented an improvement of 11.7% in the number of employes per casualty.

Although the Northwestern Pacific's passenger traffic amounted to over 147,000,000 passenger miles, not a passenger was killed, and but 9 were slightly injured. Two persons other than employes and passengers were killed during the year and 20 injured. As compared with the previous year, this was a decrease of 5 killed and an increase of 3 injured.

Forty-six safety committee meetings were held during the year which consumed 10,156 man-hours of the time of officials and employes. Two hundred and fifty recommendations were made to these meetings and 257 accident hazards that were reported by safety committee members were removed.

The Northwestern Pacific's safety organization consists of a general safety agent, 2 assistants and 68 safety committeemen. Employe members of safety committees are elected to their positions by the votes of their fellow employes.

Backwardness in Sanitary Conditions

ARTHUR BATEMAN, in *Domestic Engineering*, declares: "Lack of houses in this country has caused great increase in unsanitary conditions. At present, of 22,500,000 houses in the United States owned by occupants, only 5,000,000 have plumbing. Of 48,360 drug stores, less than 2% have satisfactory plumbing. Over 36,000 confectioneries are more than 85 per cent inadequately plumbed. Similar conditions exist in factories, workshops, schools, etc. Great sanitary improvements are necessary among farmers in the production of milk and in the construction of privies. Public comfort stations in municipalities, which are a necessity, are lacking to a very large extent."

Appeals to Reason Are Best

MR. MACK, chief State engineer, Wisconsin, believes that the greatest progress in accident prevention can be made through appealing to reason rather than to fear.

Mine Safety Equipment in W. Va.

THE West Virginia Bureau of Mines, credited by experts with the best equipment in the country for rescuing entombed miners, has added to its outfit for that work three new pieces of apparatus—a geophone, a carbon monoxide detector and a brass-incased thermometer.

The geophone is similar to a physician's stethoscope. As the stethoscope is

used to detect irregularities in the human body by sound, so the geophone is used to detect earth sounds. In this way entombed miners can be located by noting the direction from which the sound vibrations come.

Standard Headlights for Autoists

MASSACHUSETTS is recognizing the need of curbing those who by the use of automobiles are showing themselves to be a nuisance or a menace to safety. The necessity of reducing danger through the insistence upon standard headlights is coming in for needed attention.

Dangers of Acetylene Generators

THAT Mr. and Mrs. Robert Beidler and three of their four children did not meet with instant death in December, when a gas tank which was used with a private lighting plant exploded and completely wrecked their home, near Reading, Pa., was considered almost miraculous by upwards of 1,000 persons who visited the scene of the accident. One person was killed and four others badly hurt.

According to the Reading *Eagle,* the wrecking of the structure was complete in every detail. The west wall was left standing, in a very shaky condition. The other three walls were demolished, the bricks spread over a radius of 25 feet from where they once formed part of the substantial homestead. Parts of furniture and pieces of woodwork were blown into the meadow on the south side of the building to a distance of several hundred feet. The furniture was blown to pieces and a piano was reduced to bits. The window shades, ripped into pieces, were hanging on trees near the house and a small pin-cushion was blown a distance of more than 200 yards.

In January, three persons were killed and three others sent to a hospital as the result of an explosion of an acetylene gas tank in Bow, N. H. The explosion wrecked and burned the house of Arthur Curtis, in which it occurred.

In February Merl Brooks, of Ridge Road, town of Gaines, near Medina, N. Y., was severely burned about the face and hands while recharging an acetylene tank used in generating gas for illuminating purposes. An explosion occurred, causing the flames to burst into his face.

An Elevator Safety Lock That Failed

THE failure of a safety device to operate on an elevator in the Arrott Building, Pittsburgh, was responsible for a fatal accident, in September, according to the testimony of the city elevator inspector, at the coroner's inquest. The operator testified that although the lever was stationed on the center lock, the elevator ascended and the woman who was killed was caught between the floor of the elevator and the door.

Don't Run if Your Clothes Take Fire

A WORKMAN employed by the Youngstown Sheet & Tube Company was standing close to a coke-jack, endeavoring to keep warm. Having an apron which was smeared with grease around his waist, it was only a matter of a few seconds until the apron caught fire. The flames spread to the rest of his clothing. Becoming frightened and failing to listen to the other men's warning, the man started to run, which fanned the flames, and by the time he had fallen from exhaustion, his face and body were horribly burned.

Mine Safety in Pennsylvania

TWENTY-EIGHT of the 30 Pennsylvania bituminous coal mine inspectors, at a recent meeting, discussed the application of electricity to coal mining and the question of safety in the mines, as well as mining efficiency.

Education of the miner to reduce the number of accidents, standardization of mining machinery to the same end, possible dangers arising from a shot-firer having in his possession an electric cap lamp and electric detonators were among the subjects gone over.

D. H. Rene, Chief Safety Engineer

D. H. RENE, formerly employed at the Detroit branch office of the National Workmen's Compensation Service Bureau, has been appointed chief safety engineer of the Federal Surety Company. He has spent considerable time in safety engineering and accident prevention work in the large industries of Michigan, and before entering the national bureau was in charge of the air brake department of the Louisville & Nashville railroad. He is an inventor of air brake safety devices which have been adopted by the Interstate Commerce Commission and are now used on all railroad equipment.

Casualties in the Industries

THE Columbus (Ohio) *Journal*, commenting on the need for unremitting attention to the reduction of accidents in the industries, says: "Notwithstanding the development of better methods through the safety campaigns that have been carried on for years in the shops and factories of the State, and despite the safeguards against accident that have been multiplied and installed, there were 881 fatal accidents in Ohio during 1920. That means that each calendar day of the year two lives were lost and on each of 151 days there were three lives snuffed out. It is only when the year's record is made up and the total shown that one may secure full understanding of the heavy toll of life that is taken in the industrial activity of a busy State."

Safety Always and Pay Day

TALKING to the men in the Louisville & Nashville shops, Albany, Ala., the supervisor of safety, Mr. R. L. Pilling, urged invariable and prompt compliance with safety rules.

"Always have safety in your mind and heart," he said, "for you know as well as I do that it is not to be played with or cast aside like an old plaything. Those who have the habit of forgetting safety rules had better get busy and think of them before it is too late. Safety Always and Pay Day are the best of friends. When you meet them, stick to them, for without them you cannot experience and fully keep all happiness."

Fires and "Backfires"

IN Manchester, N. H., in November, one man was burned severely and a woman narrowly escaped death or injury as a result of "backfire" from a furnace in the basement of a building "which had the proportions of a terrific explosion."

In Beverly, Mass., in November, an employe in the River works of the General Electric was killed instantly because, in lighting an annealing furnace, he touched the match to the fuel underneath without opening the door of the firepot. The gas blew the door open, striking him on the head.

Safety and Health of Miners

THROUGH the joint efforts of the Industrial Commission of Utah and the United States Bureau of Mines a campaign to promote safety and health in mining communities of Utah is to be conducted during the present year. The purpose of the campaign in Utah, as in similar campaigns in other mining States, is to stimulate greater interest in safety and health with a view to reducing needless accidents and promoting the general health and welfare of mining communities. The records show that nearly one-half the deaths in the mines of Utah could have been avoided.

An Indiana Coal Dust Explosion

MILO CAMP, 31, was killed and four other men badly injured as the result of an explosion, in December, in the coal room of the Wabash Portland Cement Plant at Stroh, near Kendallville, Ind. The chief electrician and Camp, his assistant, had gone to the coal room to make some repairs to the electric starter, when a short circuit caused an explosion of coal dust that blew the windows from the building and made a noise heard for miles around.

Port Jervis Panic Exits

IN a Port Jervis, N. Y., theater there have been installed what is claimed to be the most modern panic exit devices known. They consist of a horizontal bar across each door connecting with an upright bar that locks both top and bottom. A slight pressure on the bar unlocks the doors and they fly open, thereby eliminating any chance of such a catastrophe as recently occurred in New York City.

Explosion of an Inner Tube

AT Concord, N. H., in January, an inner tube exploded in a garage with disastrous results. A press dispatch gives these details:

Albert E. Wheeler was killed and Andrew Drew and Arthur Foote were badly injured while engaged in making repairs to the tires of a truck driven by Wheeler. While at work on the machine an inner tube of one of the tires exploded and threw the heavy iron rim of one of the wheels across the garage, striking the three men and pinning them against the wall.

Wheeler sustained a fractured skull and died shortly afterward. Foote had one finger torn off, the end of another mangled and was also severely cut about the head and shoulders, as was Drew.

Chicago Safety Council

THIS is a wide-awake organization which functions under the direction of an advisory committee, of which William Otter of Marsh & McLennan is chairman. At headquarters the work is in charge of Harry J. Bell, secretary, and E. G. Laughlin, assistant secretary.

Its activities are divided into four major divisions known as Public Safety, Industrial Safety, Railroad and Public Utilities and Business Administration. It is conducting free educational courses for the instruction of safety supervisors, foremen and others. Fire prevention is one of the things to which it gives close attention. In a recent bulletin the Chicago Council said: "Industrial managers and safety engineers who have had the widest experience in accident prevention are convinced that the industrial accident problem can never be solved and the public accident problem cannot even be touched until safety is incorporated into the community life and is organized just as there is organized health or any other activity having for its purpose the conserving of human life."

In 1920 more than 2,000 persons were killed by accidents in Cook county, Ill., and it is estimated that the fire loss in the county reached $6,000,000. Motor vehicle accidents killed 540 persons in Cook county in 1920, compared with 5 persons in 1905. The number of non-fatal accidents in the Chicago district last year is not known, but approximately $5,000,000 was paid by employers in compensation for accidents.

How Not to Use Kerosene

A GREENFIELD (Ohio) family, comprising six persons, was wiped out, Sunday morning, January 23, by an explosion of kerosene that was being used to kindle a fire. "The six bodies were burned so that they bore no resemblance to human beings." At the request of his wife, the Greenfield *Republic* relates, the father arose to prepare a remedy for a child, threatened with the croup. He placed kindling in the stove, but the fire not starting off quickly enough, he poured oil on it from a two-gallon can. The explosion followed, throwing the burning oil all over the room.

Vigilance Committees for Autoists

CECIL G. RICE, president of the Western Pennsylvania Division of the National Safety Council, thinks it may be necessary to form vigilance committees to assist peace officers to stop reckless drivers of automobiles. There should also be established, he says, a traffic court where violations can be dealt with without fear or favor. Passage of laws requiring reasonable and practical proof of a person's ability to handle a car should be urged.

The Descent of Man—Every Day

IT is fortunate for the memory of Sir Isaac Newton (*Protection*, published by the Travelers Insurance Company, comments) that he was only the discoverer and not the originator of the law of gravitation. Otherwise, the human race could not forgive him for the injuries caused by falls. In a single morning, the insurance company says, it received information of accidents from these causes:

The old banana skin, hero of a thousand comic supplements, after a short rest seems to be back on the job again. A Denver man was tripping gaily into a store with a kitchen stove on his back when he landed on a piece on the doorstep. The stove went down the cellar steps, its bearer went through the cellar window and from there on to the hospital.

A Republican senator, campaigning for Harding, stumbled over a drag line of a steam shovel on the Shoshone reclamation project and broke a leg.

Apple trees have been connected with falls ever since the time of the Garden of Eden. A well-known resident of Beachville, Ontario, fell from an apple tree and was killed.

A Boonville, Indiana, farmer fell out of his barn and was killed.

A Coatesville, Pa., workman fell off a bridge and sustained injuries which afterward proved fatal.

A Toronto lineman fell from his telegraph pole and broke three ribs.

Two Boston men fell through the window of a cage—one was seriously injured. The other disappeared.

A Baltimore patrolman, while searching in some undergrowth near the city, fell over an embankment 20 feet high and seriously injured his arm.

The moral of all these incidents seems to be that you don't need an automobile to become injured. You don't even have to go up in an airplane to suffer a fall, and unless a man lives lying down on the ground in the region of the Dead Sea, which is one of the lowest places on the earth's surface, there's some lower place he can fall to.

State Safety Magazine Revived

THE Industrial Commission of Wisconsin has revived the publication of the *Wisconsin Safety Review*, a magazine upon accident prevention. This publication was issued regularly from June, 1918, to June, 1919, but was then discontinued because the editor left the service of the commission. F. W. Huels, hitherto with the railroad commission, has been employed by the industrial commission as publicity deputy and among other duties he will edit the *Safety Review*. It is intended to distribute the magazine among foremen in industrial plants.

To Make Safe Aerial Navigation

THE Underwriters' Laboratories is to undertake tests of materials and devices employed in the assembly and equipment of aircraft in order that the hazards of aerial navigation may be reduced. An officer of the laboratories is to serve as chairman of the Sub-Committee on Planes and Engines of the new Aviation Section of the National Safety Council. The test work to be done by the laboratories is of two principal sorts:

The first is the examination and testing with a view to listing the various materials and devices employed in the assembly and equipment of aircraft. Of this class are the following: Fittings of either ferrous or non-ferrous metals; such as turnbuckles, clevises, landing gear parts, specialty bolts, washers, nuts, thimbles, etc., and parts of wood or composition material; electrical accessories, lamps and lamp fittings, wires, cables, switches, relays, generators, motors, batteries, etc.; instruments, tachometers, inclinometers, altimeters, clocks, etc.; accessory hardware, safety belts, gasolene tanks and fittings. Devices such as are indicated above when examined and classified are to be required or permitted in the assembly and equipment of airplanes or other aircraft. The laboratories contemplate the publication of lists of such appliances corresponding to its present lists of inspected electrical fittings, mechanical appliances, etc.

Then there will be the work of classifying completely assembled airplanes as to type, design, equipment and ability in operation and the facilities and practices of manufacturers. The classification proposed includes distinguishing between airworthy and suitably equipped and safeguarded airplanes and those judged unworthy or hazardous from an insurance point of view; also a classification of the airworthy devices as to service limitations, radius of operations, speed, ceiling limit, useful load, landing speed, etc., etc.

For the present at least all work with regard to aviation will be handled at the main plant in Chicago. Presumably from 12 to 18 months will elapse before the plant is in full and active operation.

Menace of Motor Busses

OPPOSING a general bus franchise in the City of New York, the Executive Committee of the Merchants' Association declared that "motor bus traffic, most highly developed in the City of London, has proved exceedingly dangerous. In 1912 there were 28,000 power vehicles operating in the streets of London. Of these 3,000 were motor busses. The latter caused 141 fatalities, while the remaining 25,000 power vehicles caused 137 fatalities. It will thus be seen that motor busses are by far the most prolific cause of danger to human life upon the crowded streets of a city, particularly in a city like New York, where the motor vehicles are already five times as numerous as in London."

Firemen as School Teachers

IN addressing the safety organization of the Cudahy Packing Company in Sioux City, Iowa, John Yeager, assistant fire chief of that city, advanced the idea that firemen should be trained to give talks to children in the public schools on fire prevention subjects. His theory is that children are friendly to firemen, and that what a fireman would say would make a deeper impression than if presented in the course of an ordinary lesson. In the course of his address Mr. Yeager remarked:

"Instead of setting aside one day in the year for fire prevention, make every day a prevention day. When you come to your departments in the morning see that all doors and windows leading to exits are marked with signs that can be plainly read. At no time permit anything to be left where it would interfere with the working of self-closing fire doors. In cases where highly inflammable materials are stored the fire doors are an important factor in keeping a fire from spreading. They should be inspected at regular intervals. If the fusible link should give way, from some cause other than fire, make repairs at once.

Too much cannot be said in regard to the efficiency of fire pails and water casks as fire preventors. Don't allow these pails to be used for other purposes. See that they are kept hanging in their place. Don't pile any material that would block the passageway in getting to the cask. Fire in the plant may mean loss of wages, so it is to your advantage to be alert at all times.

The hand fire extinguishers are an important factor in preventing losses. Keep them in plain view, and instruct the men how to use them.

Now we come to the most modern fire preventor of them all the automatic sprinkler system. I class it so because it is at all times effective if in perfect order. Action of sprinklers requires about 24 inches clear space below so that they may form an unbroken spray of water from sprinkler to sprinkler head. I have found, while making inspections, sprinkler heads used as clothes hangers. This I class a piece of carelessness on the part of the foreman. The clothes would prevent the heat reaching the fusible head as the fire passed on.

Keep your eyes open at all times. Don't allow rubbish to accumulate. When the fire department arrives turn the job over to it and offer your help to your chief.

The Kind of Man to Interest

A SOUTHERN safety organization says: "The man who informed us that he did not think that safety meetings were of any value to the managers and foremen is the kind of man whom we are trying to get to attend safety meetings. The other kind of man does not need any second invitation. He knows the value of them."

Fires from Locomotive Sparks

THE Mutual Fire Prevention Bureau calls attention to the fact that the fire losses in 1919 of 75 railroads, analyzed by origin classification, show that out of a total of 9,194 fires, 3,080 were caused by sparks from locomotives. The Fire Prevention Bureau comments:

"Think of it! 33.5% of all railroad fires are caused by sparks from locomotives. The railroads have openly condemned themselves. It does not seem possible that they will continue to wantonly destroy their own property, but that is just what they are doing. Locomotive spark fires are preventable. Such pressure must be brought to bear as will make them realize the enormity of their crime."

In the meantime mill and elevator owners having property adjacent to the railroad right of way should give particular attention to making their plants proof against sparks. The old shingle roof is fast disappearing along the railroads. Weeds and grass should not be permitted to grow close to frame buildings,

windows that are to be left open should be carefully screened, and broken windows quickly replaced, loose iron cladding and broken siding repaired, litter not allowed to accumulate, and car doors should be piled at a safe distance from the building. Birds' nests in eaves and cornices cause many locomotive spark fires.

Toonerville Fire Department

FROM the Toledo (Ohio) *Blade,* which directs its humorous remarks to the neighboring city of Upper Sandusky:

Upper Sandusky—when an alarm was turned in, the hose cart, hitched to a delivery truck, was rushed to the scene of the conflagration. A wrench to connnect the hose to a water plug was missing, and after considerable delay a messenger returned from the station with the tool. When the hose was attached to the fire plug two firemen, encouraged by the shouts of bystanders, galloped in the direction of the smoking residence, hauling the hose end while the reel on the cart spun around. They discovered the nozzle was missing. Some one rushed the nozzle from the city hall, and again the firefighters turned their attention to the house, where, by this time, a black cloud of smoke was pouring from an upper story window. A cry went up for "ladders." It was found these, too, had been left at the station. While they were being brought up from the rear, neighbors, at the entreaty of Mrs. Smith, threw several buckets of water on a blazing carpet in her bedroom and extinguished the flames. The fire chief, interviewed following the fire, stated in explanation of the delay that the firemen had stored their equipment for the winter.

Protection Against X-Rays

PROTECTION of operators against the effects of X-rays has been secured by neutralizing ultra-violet rays with a simultaneous application of intra-red rays according to Daniel Berthelot's announcement in the Academy of Sciences that his colleague, Dr. Pech, had perfected this protective system.

Paint Store Explosion

WHILE filling a barrel with asphaltum paint, an employe of a Portland (Me.) paint store was thrown a considerable distance and burned about the body by an explosion. He was hurled across the cellar, his injuries caused by impact against boxes and barrels. The elevator happened to be at the bottom and the doors and windows were wide open, so the force of the explosion was spent upward and outward. The sprinkler heads started working promptly, drowning out the blaze.

Safe School Buildings

IN Miami, Okla., public schools are being erected on a new safety model. They are especially designed to eliminate as far as possible danger from fires. For this reason they will be 1-story in height and will be arranged so that all pupils can get out quickly in case of emergency.

(*Continued from page* 51)

studies, that the majority of industrial accidents occur during the closing hours of the day, when artificial light is required. Adding the extra hour of daylight will tend to reduce such accidents.—*F. A. K. Boland, Merchants' Association and Hotel Men's Association.*

No Substitute for Daylight

I say for the Western Electric Company of New York City, which has an employe list of over 5,000, that we are heartily in favor of the Daylight Saving. We have seen the benefits that are derived from Daylight Saving and we realize that nothing can be substituted to take its place. It is the one delight, it is the one vacation, that all the workers enjoy in the city.—*Allen Robertson, Western Electric Company.*

The Additional Recreation Hour

I am an employe of R. H. Macy & Co., the big department store. I can say for the members of the firm, the general management, the heads of departments, all the employes, down to the humblest messenger or cash girl, that we ask the Legislature to leave us Daylight Saving. We want to keep it. We want that additional recreation hour.—*Alexander Kinkhead, R. H. Macy & Co.*

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

G. E. Sanford, Pres. C. Van Horn, Treas. F. A. Doody, Sec.
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Regular Meetings—Third Friday of each month at 8 P. M.

The next regular meeting of the society will be held on the Fourth Friday of March

FEBRUARY AND MARCH MEETINGS

THE subject for discussion at the meeting on February 25 is "Safety to Life in Ship Construction and Operation." The program: "Safety to Life in Ship Construction," by S. Clarke Brandenstein, formerly of the Sun Shipbuilding Company. "Accident Prevention Work in Shipbuilding," by Thomas A. Walsh, Merchant Shipbuilding Corporation. "Some Statistics with Reference to the Marine Fire Hazard," by F. S. Titsworth, Walter Kidde & Co. "Safety to Life in Ship Operation," by Captain R. A. Barber, marine surveyor for F. H. Price & Co., formerly first officer of S. S. *Lusitania*. Open Discussion.

The March meeting will be devoted to the subject of structural demolition. The speakers are as follows: Hugh Frayne, general organizer, American Federation of Labor; Frederick C. Kuehnle, chief inspector of buildings for Manhattan; Peter Spence, New York. State Labor Department; Albert A. Volk of the Albert A. Volk Company, the largest structural steel demolition company in the eastern section of the United States, and W. E. Welch, senior contract inspector of the Travelers Insurance Company. As will be noted, this is a representative group of speakers, since 5 distinct interests are covered; namely, a labor union, the city, the State, a demolition company and an insurance company.

ADDRESS OF THE RETIRING PRESIDENT, MR. H. WEAVER MOWERY

At the annual dinner at the Hotel Navarre, New York, in January, the retiring president, H. Weaver Mowery of New York, submitted his report to the society for the closing fiscal year—a report of steady and substantial progress:

ANNUAL REPORT OF THE PRESIDENT—AMERICAN SOCIETY OF SAFETY ENGINEERS.

New York, N. Y., January 20, 1921.

This splendid gathering is evidence of your keen interest in the activities of the American Society of Safety Engineers, and, therefore, it gives me particular pleasure to review some of the accomplishments of the society during my administration.

In June, 1919, it was felt that the society should undertake different activities from those in which it had been engaged prior to that time. It had been a purely local organization, for social purposes and for the educational advancement of its members. It had no real contact with any of the national engineering organizations, and it was taking no part in the great national accident prevention movement.

WORK OF REORGANIZATION COMMITTEE

A reorganization committee was appointed, of which I was chairman, and during the summer of 1919 practically my entire time was devoted to the writing of a constitution which should allow the society to function nationally, with definite worthy objects in view.

At a meeting called in the fall of 1919, the report of the reorganization committee was accepted, and eventually the constitution was adopted as written, with a few minor changes regarding membership qualifications and dues.

It is interesting to note what have been the results achieved by this reorganization. From 1912, the time of the beginning of the original organization, known as the United Association of Casualty Liability Insurance Inspectors, through the first reorganization in 1914—when the present name was assumed—up to September, 1919, the beginning of the now outgoing administration, the total recorded memberships were 188, of which 17 had paid no initiation fees or dues; 84 had paid some dues and initiation fees, and 43 had resigned, leaving 44 only in good standing. By March, 1920, our membership roll had increased from 44 to 164, as a result of the first membership campaign; and up to the present time there have been 341 paid memberships for the year, showing an increase of some 800%.

As to finances—on November 10, 1919, when they were turned over to our retiring treasurer, there was in the bank $290.85, there being no other assets of the society worthy of mention, excepting its records and membership roll. On January 20, 1921, there was cash in bank, $573.72; bills receivable (not membership dues), $102.15, and furniture valued at $40, making total assets of $715.87. In addition, it should be noted that, for the first time in the history of the society, a paid secretary has been maintained throughout the entire year, at an office rented for our headquarters in the United Engineering Societies building.

The society is now a going concern, and the mechanism for carrying on its work is running smoothly.

Relations With Other Societies

To show the acknowledged standing that the society has acquired during the past year, we can point with pride to affiliations and arrangements for the exchange of courtesies between ourselves and the following societies: American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Institute of Mining & Metallurgical Engineers, Illuminating Engineering Society, National Electric Light Association, Society for Electrical Development, National Fire Protection Association, Canadian National Safety League and the British Industrial Safety First Association, and from far off Australia comes recognition of our existence in a letter just received stating that no organization for accident prevention activities existed there and requesting all the aid and information we could give.

It has been pleasant to hold joint meetings with the New York section of the National Fire Protection Association and the New York local of the Illuminating Engineers, both of which joint meetings were well attended and decidedly instructive. It is hoped that more of these joint meetings will be arranged for the future; in this manner, accident prevention work is more closely brought to the attention of the various branches of engineering.

Meetings Devoted to Special Fields

In addition to the joint meetings, the society has held 10 other meetings, each of which was devoted to some particular field; as, for instance, the meeting devoted to elevator safety, at which there were 6 papers read. The first, on the hazards of elevators, showed the relative seriousness of different types of hazards, with charts that had been developed visualizing the relative number of accidents from each of the causes, and a comparison with some other forms of hazards. This paper was presented by the chief engineer of the National Workmen's Compensation Bureau. The next paper of the evening was on the development of elevator safety, by a man foremost in such work, the chief engineer of the Otis Elevator Company. One of the principal safeguards, mechanical interlocks, was next described by one thoroughly familiar with the subject. A representative of one of the largest cable manufacturers then presented a paper on elevator cable safety, and the program for that evening closed with two papers showing what constituted proper elevator construction, in which were brought out the chief causes of elevator accidents and how these things are overcome by careful inspection.

The foregoing gives an idea of the method of covering each particular field at the meeting devoted to it. Other meetings covered the following: Safety in lumbering and logging; safety in compressed air work in tunnel and foundation construction; safety in ladders and scaffolds; importance of engineering revision in safety work; education for the safety engineer; head and eye protection code; fire protection from the point of view of safety to life; the safety engineer.

"Safety Engineer" Defined

It is worthy of note that the first definition of "safety engineer," in a few words, concise and yet all inclusive, is that given by our former vice-president, Mr. Rausch, at one of the first meetings, as follows:

> "Any person who, through adequate training and appropriate experience, understands and can interpret the laws that control the materials and forces of nature and their effect upon the human body, and is capable of controlling or using those forces in a manner that prevents their harmful effect upon human life, may be said to be a safety engineer."

An important, and perhaps little known activity of the society, has been participation in the formulation of national safety codes. The society has accepted an invitation from the American Engineering Standards Committee to act as sponsor for the ladder code. The work of preparing this code is now in progress. All interested national organizations and well known experts in any way interested have been invited to participate. The personnel of this and other committees will be given elsewhere.

The society organized a thoroughly representative committee for work in preparation of the head and eye protection code, which elected a delegate who represented the society on the Bureau of Standards Sectional Committee. Our representatives are taking a prominent part in the work of the Elevator Standardization Committee and the National Safety Code for Elevators. We have appointed a delegate who is co-operating with the National Safety Council in the formation of a punch press code and with the Bureau of Standards on the lumber and saw mill code.

In connection with code work, it may be well to mention that the expenses incident to sponsorship are considerable, inasmuch as the body which stands sponsor for a code must meet all executive and administrative expenses in preparing and formulating the code. At the beginning of this work, it was considered advisable to apply for membership in the American Engineering Standards Committee; but upon being informed that membership was not essential to participation in the work but that participation would be assigned to such bodies as had facilities to undertake it, and because of the lack of funds, we did not apply for membership. It is to be hoped that a means will be found whereby a more important part may be taken by our society in this most excellent national activity.

Arrangements were made immediately after the reorganization to have our proceedings and announcements made public through Safety Engineering, which has been designated as our official medium by action of the executive board. This publication is sent, without additional cost, to all members in good standing, and in it is published the news regarding the society and all papers presented at its meetings. The employment bureau is another innovation. A member safety engineer desiring a position may have his wants advertised without charge in the columns devoted to our affairs in Safety Engineering.

Speakers for Factory Meetings

During the past year several requests have been made for speakers to talk on various safety subjects at factory meetings. The Safety Institute of America was suggested as being able to function in this particular manner, and they were requested to supply such speakers. They replied, however, that it was not possible for them to perform such service for any who were not members of the National Safety Council or contributors to the Safety Institute. Thereupon, the society developed a list of speakers to talk at meetings, without any expense to the companies requesting such service other than the necessary traveling expenses.

A library is always a very important feature, and it is a pleasure to announce that arrangements were completed early in the year with the United Engineering Society's library to list and file all desirable books, periodicals, photographs, etc., pertaining to accident prevention activities. Our members are invited to avail themselves of the opportunities afforded by this connection. It is requested that members send in books, drawings and other data that will be of value in the library. Credit will be given the donors.

It is perhaps fitting that the retiring president, in the light of his experience, should make some recommendations for future activities.

Importance of Training Work

The most important work of the society is, of course, carried on through the functioning of the various committees in accordance with the constitution; but it is desired at this time to emphasize the great importance of the work to be performed by the educational committee, which should endeavor to develop a course or method of training that will result in some official authentication of satisfactory attainment, to the end that a well defined profession of safety engineers may result.

The finance committee should become increasingly active, as the work of the society broadens. The cost of code preparation and promulgation, and of the many other activities in which the society desires to engage is much greater than it can bear through membership dues. It would seem that an endowment fund should be raised, and perhaps a special fund for code work.

The publicity given the society, of course, determines largely the power that it will have and the prestige that it will enjoy. It may be desirable, therefore, to reprint and offer for sale papers that have been presented at the meetings of the society. The committee on meetings should refer to the constitution and have clearly in mind their duties. The policy of having programs for each meeting prepared by an expert in

a particular line has resulted in numerous good meetings and might well be continued. It is suggested that arrangements be made for a joint meeting with the New York local of the A. S. M. E. to discuss safety from an economical standpoint. The committee on meetings, or some sub-committee, should arrange for a more prominent part in the annual congresses of the various State industrial commissions.

PROMOTING PUBLIC APPRECIATION

Perhaps the most important of all is the work of the public relations committee, which should endeavor to increase public understanding and appreciation of the economic value of safety engineering. To this end, all the committees and officials of the society should endeavor to furnish information to this committee that will be of value to it in carrying on this work.

On internal affairs, it is very important that a good office system shall be inaugurated to handle correspondence, accounting, etc. In closing, I want to express my sincere appreciation of the hearty cooperation that has been given me by the members of the executive board and the society in general, in carrying out the objects of the society as adopted at its reorganization. And in relinquishing the honor of the presidency of the society to my worthy successor, Mr. Sanford, I feel that the promotion of the arts and sciences of engineering, as applied to safety to life and property, will be placed in most able hands.

ADDRESS OF THE INCOMING PRESIDENT, MR. G. E. SANFORD

In accepting the office of president, at the annual dinner, the newly elected executive, G. E. Sanford of West Lynn, Mass., spoke as follows of the year to come:

In accepting the office of president, to which you have elected me, I wish to state that I will give the society the best that is in me for the furthering of its ideas.

Our retiring president, Mr. Mowery, has stated that during the past year the society has grown from a local New York City organization to an organization of national dimensions. I wish to amend those remarks by stating that the society has grown to international dimensions. We have one member in Japan; we have another whose address, the last I knew, was in France. A French gentleman who has been spending several months in this country, sailed for his home in Paris only last week, carrying with him a considerable number of application blanks for membership in the society, and I have hopes that he will be heard from in the near future by sending back applications.

PLANS FOR THE PRESENT YEAR

You have been told of some of the activities of the society during the past year. I wish to give a brief outline of some of the things which we propose to consider during the present year. The meeting in February is devoted to the subject of marine and shipbuilding safety. The March meeting will be given up to safety in the destruction of buildings, including not only small brick and wood buildings, but also the destruction of the structural steel buildings and those with heavy masonry; such as we have a number of cases of at the present time. Another meeting is being arranged for by the general agent of the Underwriters' Laboratories. Still another meeting will be held covering the subject of educational work for colleges, factories, etc., on safety subjects. I expect that a semi-annual meeting will be held in June similar in its arrangement to the meeting which is being held tonight, and which will probably be held in some one of the nearby seashore locations.

Two months ago, when the office of president of this society was tendered to me, I was somewhat hesitant to accept, owing to the fact that my office is located approximately 250 miles from New York City, and I felt that the president, to be most efficient, should be within easy reaching distance of the office. I have since arranged, however, for an executive committee of the board of directors, any or all of whom may be called upon in an emergency by the secretary or by others. This committee consists of the following: Eckford C. De Kay vice-president; C. Van Horn treasurer; H. W. Mowery, Jr., past president. These three gentlemen are all located in the city and any of them may be readily reached.

COMMITTEE MEMBERSHIP

There are a number of permanent committees of the society, membership of which is limited by the constitution and by-laws to five each. It is the opinion of the officers that this organization should be an organization of all of its members—not to be handled entirely by a clique, as represented by the board of directors—and it is my most earnest request that members of the organization who feel that they have the qualifications and the time to give to the society's interest, let me know what committee or what code work they feel that they are personally fitted for, and I will be pleased to consider them for such places at the first convenient opportunity.

With this matter in mind and in order to afford an idea as to the nature of such committees, the following list of the committees and the names of the chairmen who have already accepted are given:

Finance Committee, Eckford C. De Kay.
Constitution and By-Laws, C. Van Horn.
Meetings, William Newell.
Membership, W. E. Crippen.

At this point I wish to mention that the committee on membership should include every member of the society. It is impossible for a committee of five members to solicit the entire country with a view to gaining additional membership through calling to the attention of desirable individuals the fact that such society exists. I hope, therefore, that each member of this society will take it upon himself to bring in not one member, but at least five members. Some of us will bring in more than that; others less, but I sincerely hope that every member of the society will consider himself an ex-officio member of the membership committee and get to work on that basis.

Library and Museum, F. B. Schroeder.
Standards, H. G. Wiberg.
Public Relations, M. R. Hutchinson.
Publications, F. V. Clark.
Code and Legislature, E. D. Haggerty.
Education, J. A. Robinson.

The society has been given the sponsorship of the national code on ladders by the American Engineering Standards Committee. It is the intention of your board of directors to give all members of the society a chance at any code work which the society may sponsor. This will be done by publishing tentative draft of any such code in SAFETY ENGINEERING, in the hope that the members will be sufficiently interested to send to such committee, or to the secretary of the society, their constructive criticism of such tentative codes.

In behalf of the board of directors of your society, I sincerely hope that you will give the society and the directors whatever help you can toward the furtherance of the society's interest, and in that way let us all pull together for one common goal.

TITLES OF SOCIETY PAPERS, 1920

JANUARY

THREE PERIODS OF ENGINEERING REVISION. By Lucian W. Chaney, United States Bureau of Labor Statistics.

FEBRUARY

THE DEVELOPMENT OF SAFETY ENGINEERING. By A. W. Whitney, general manager, National Workmen's Compensation Service Bureau.

MARCH

ELEVATOR HAZARDS. By C. N. Young, chief engineer, National Workmen's Compensation Service Bur.

DEVELOPMENT OF ELEVATOR SAFETY. By David Lindquist, chief engineer, Otis Elevator Company.

ELEVATOR INTERLOCKS—MECHANICAL. By C. W. Old, Shur-Loc Elevator Safety Company.

ELEVATOR CABLE SAFETY. By John W. Troescher, John A. Roebling's Sons Company.

WHAT CONSTITUTES PROPER ELEVATOR INSPECTION. By D. J. Gitto, Ætna Insurance Company.

APRIL

LADDERS AND SCAFFOLDS IN GENERAL BUILDING CONSTRUCTION. By Alfred E. Davidson, treasurer and safety director of the Chesebro-Whitman Company.

THE REQUIREMENTS OF THE INDUSTRIAL CODE RELATING TO LADDERS AND SCAFFOLDS. By Peter C. Spence, mechanical and civil engineer, New York State Industrial Commission.

MAY

TUNNEL CONSTRUCTION AND SAFETY FEATURES CONNECTED THEREWITH. By Clifford M. Holland, chief engineer of the New York State Bridge and Tunnel Commission and New Jersey Inter-State Bridge and Tunnel Commission.

THE AVOIDABLE HAZARDS IN PNEUMATIC CAISSON WORK. By Daniel E. Moran, consulting engineer, New York City.

SAFETY AND MEDICAL METHODS IN CONNECTION WITH COMPRESSED AIR WORK. By Dr. Edward Levy, medical director of the Public Service Commission.

OCTOBER

DEFECTIVE ILLUMINATION, A CAUSE OF INDUSTRIAL ACCIDENTS. By R. E. Simpson, safety engineer, Travelers Insurance Company.

REDUCTION OF ACCIDENTS THROUGH VISUAL ACUITY. By H. F. J. Forter, Society for Electrical Development.

ELEMENTS OF GOOD INDUSTRIAL LIGHTING. By S. E. Doane, past president, Illuminating Engineering Society.

INDUSTRIAL LIGHTING EQUIPMENT AND ITS MAINTENANCE. By S. G. Hibben, Westinghouse Lamp Company.

SAFETY DISCONNECTING HANGERS AS A SAFEGUARD. By A. J. Thompson, member of American Society of Safety Engineers.

NOVEMBER

DATA ON ACCIDENT FREQUENCY IN THE LOGGING AND LUMBERING INDUSTRY IN THE PROVINCE OF ONTARIO. By F. Hawkins, secretary, Lumbermen's Safety Association, Ottawa, Ontario.

THE HAZARDS OF THE LOGGING INDUSTRY—MECHANICAL VERSUS HUMAN. By W. Graham Cole, director of safety and industrial relations, Southern Pine Association, New Orleans, La.

INSPECTIONS FOR HAZARDS IN LUMBERING AND LOGGING. By C. O. Hero, safety engineer, Lumber Mutual Casualty Company.

THE NEED OF A NATIONAL CODE ON LOGGING AND SAW MILL OPERATIONS. By J. A. Dickinson, assistant engineer, Bureau of Standards, Washington, D. C.

DECEMBER

AMERICA'S CHALLENGE: LOSS OF LIFE FROM FIRE AND SAFETY ACTIVITIES OF THE PAST. By H. Walter Forster, vice-president, Independence Bureau, Philadelphia, Pa.

SAFETY TO LIFE FROM FIRE IN HOTELS By A. T. Bell, Manager Hotel Chalfonte, Atlantic City, N. J.

SAFETY TO LIFE FROM FIRE IN THEATERS. By Rudolph F. Miller, superintendent of buildings, New York City.

SAFETY TO LIFE FROM FIRE IN SCHOOLS AND COLLEGES. By Frank Irving Cooper, chairman. committee on standardization schoolhouse planning and construction, National Education Association.

FIRE PROTECTION FEATURES IN SAFEGUARDING LIFE. By Henry A. Fiske, manager, inspection and service department, Grinnell Company, Providence, R. I.

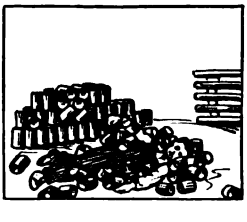
AMERICA'S OPPORTUNITY: CONSERVATION OF LIFE FROM FIRE. By T. Alfred Fleming, supervisor of conservation department, National Board of Fire Underwriters.

POSITION WANTED

Safety Engineer and Personnel Manager, eight years' practical experience in manufacturing, last connection, Director of Health, Safety and Sanitation for 22 plants of 33,0000 employes, open for an engagement immediately. Salary commensurate with size of opportunity for showing results in savings of dollars and cents. Address A. S. S. E. No. 8, SAFETY ENGINEERING, 80 Maiden Lane, New York City.

Safety "Movies"

Carelessness



Accident

First Aid

Lost Time

Courtesy of National Tube Co. (Pennsylvania Works)

These pictures show an accident that actually occurred. It seems ridiculous for a man to take couplings from the middle of the pile, but a man did. BE CAREFUL.

"The Man On The Job"

The Morale of Safety

Morale.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 453 Safety Measures. — Bicycles, Stairways, Fresh Air, Electric Lights. — We have many hundred bicycles at this plant. We provide a long, narrow alley where the bikes are hung up on strap iron hooks, engaging the front wheel. This method requires much less space than if parked with two wheels on the ground. There is a roof over the bikes, projecting 18 inches from the wall. This alley empties into a main street, and at noon and night there has always been great confusion at the intersection of the street and bike alley. Many accidents have resulted from collision. The solution was very simple. We placed a board 2 x 12 inches on edge on the ground right across the alley entrance. This forces all bike owners to dismount when arriving or leaving.

The stairway in our main office building is very wide and accommodates many female employes. Many injuries have resulted from falls. High heels become hooked behind brass nosing. We have had no falls since placing on each tread a 5/8-in. rubber mat, full length and width, and deeply corrugated lengthwise. For cleaning, janitors turn mats top side down and replace quickly.

In one of our accounting rooms we have about 200 clerks. There are no outside windows or doors. We have 4 fresh air fans pumping fresh air in and 4 exhaust fans pumping foul air out. In addition to this we have 2 Ozone Pure Airifying machines. We have received no complaint from clerks in the last 2 years as compared to many per day previous to that time.

Each of our 24 drafting tables is equipped with 25-watt lamp, covered by a small, half spherical, turnable shade, attached to one end of a telescopic metal arm (similar to a telephone extension arm). This arm is pivoted to a 1-in. iron pipe, which is, in turn, screwed into a floor flange which is bolted to the floor. It will be readily noted that jarring of the table will in no way vibrate the lamp, as the lighting fixture is fastened to the floor. The pivot, movable shade and extension arm permit the draftsman to focus his light where desired. The real advantage over the overhead light is plenty of light where wanted, reduction from 150 watts to 25 watts, no shadows and much less eyestrain and fatigue. Since this installation we have noted a marked increase in output from our engineering department and more satisfied draftsmen.

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No. 454 Safety Engineer and Compensation Insurance. — A prominent manufacturer said to me the other day: "What do you find that the average safety engineer knows about compensation insurance?" After due consideration I frankly admitted that the average safety engineer—in fact, the majority of safety engineers—knows little or nothing about the application of compensation insurance to his plant.

Of course, he knows that the P. Q. Insurance Company carries his plant, and charges so much per $100 of payroll for doing it. He remembers that he receives

a list of recommendations every so often from the inspection or service department of the insurance company as a result of some inspector's visiting his plant and finding various conditions which did not meet with the standards as laid down in the State Rating Schedule.

He remembers, too, having received a letter or having been told by the insurance company that he can receive a credit on his rate or premium by eliminating the conditions or recommendations sent him. At this point, however, it is going to be necessary to make a distinction between the average or the "above-the-average" safety engineer. The average safety engineer is satisfied to know that, by eliminating the various conditions submitted, he can reduce his compensation insurance materially, while the "above-the-average" safety engineer wants to know the story from beginning to end and a lot of the insurance engineers are glad to tell the compensation insurance story from beginning to end, because they believe and know that co-operation is the life of the plan. The story isn't so long as most people think, and it's interesting —very interesting.

I was amused at a conversation overheard on the train some time ago between two plant safety engineers whose plants are carried by two well-known insurance companies. The men agreed that compensation insurance was an awful graft for some one, and they further cherished the thought that old-fashioned, bearded men get together and agree that they need more spending money, so advances the insurance rates accordingly. Now, men in this frame of mind can never hope to accomplish much in educating and preserving human life. Such thoughts or theories are ridiculous and reflect ignorance of one's own work.

Good books have been written on compensation insurance; many insurance companies issue special booklets, folders and reports on every phase of the plan, and such information is free for the asking.

Some one has asked me to mention a few of the fundamental points that safety engineers should know regarding compensation insurance as applied to one's plant. The following represent some of the more important: (1) How are compensation rates made and by whom applied? (2) What are the basic or manual rates of a classification? (3) What is schedule rating and how is it applied? (4) What is experience rating and how is it applied? (5) How does the schedule and experience rating modification affect a classification? (6) How do plants of similar classifications compare—above or below the average?

It is true that many safety engineers probably can point with pride to an exceptionally low final insurance rate. It may be due to a well guarded plant, thus allowing a schedule credit; or, again, it may be due to few accidents occurring, which produces an experience credit. In either case, assuming that the safety engineer knows nothing of the application of insurance to his plant, it is to be said that men do make some very good records through their handling and investigating of all accidents, and through the elimination of what they believe to be hazards. At best, however, this plan can function only slowly or in proportion to the nature of the accidents occurring.

Concluding, with picturing the "above-the-average" safety engineer, who thoroughly understands the application of insurance to his plant, we find a thorough, systematic plan of accident control in force, based on the actual natures, frequency and severity of accidents compared with similar classifications; facts against hit-or-miss tactics—the result being humanitarian life saving and minimum insurance cost. One man, by knowing, starts out to accomplish; the other man, by not knowing, starts out to look for what he would like to accomplish.

(Note: This article principally concerns safety engineers located in States where compensation insurance is in force. The fundamental principles, however, can be used to good advantage by safety engineers regardless of location.)

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No. 455 WORKMEN'S SAFETY COMMITTEES. — Practically every plant in the United States where there is any effort looking toward

the elimination of accidents and the practice of the principles of "Safety First" has a workmen's safety committee. In some plants the committee is active and a real force in the organization, but a thorough examination of a majority of the plants will reveal the fact that, except for a few members of such committees, there is no real, personal effort or desire on the part of the individuals to "act well their part."

Why is this true? The management in most cases has given its approval and sanction to the appointment of such a committee, and the safety man or the shop superintendent does his part. Where, then, does the failure exist? Personal experience leads one to the belief that this is due to the lack of enough authority vested in the members of the committee.

Under the usual plan, the committee is under the direct control of the safety man, the shop superintendent or one of the foremen, and the members come to the meetings and perform the work assigned to them, but they do these things because the company pays them for doing them, and not because of a personal interest on their part.

How, then, can we secure better results? How make them feel that their *real value* as a member of the safety committee is to give their whole heart to the work and to live and preach safety to their fellow-employes? This can be done only by making the committee self-dependent or independent of the leadership of the safety man, superintendent or the foreman.

The general committee and the foreman's committee are important, and nothing should interfere with the good work done by the committees, but the burden of good safety work and the spread of interest throughout the plant are and should be in the hands of the workmen's committee. The men alone can reach the individual workmen in the shop by personal contact; the foreman or safety inspector is looked on as "one of the bosses," and the personal touch is lacking.

DUTIES AND PRIVILEGES

The following plan, which embodies well-known duties severally assigned to the foreman's committee and the workmen's committee, should, I believe, be handled by a workmen's committee alone, and their authority to perform their duties backed up by the whole authority of the management:

1. The workmen's committee should consist of one man from each principal department in the shop.

2. Membership on the committee should be for a period not to exceed 1 year.

3. Meetings should be held weekly under the supervision of the safety engineer, but should be conducted by a chairman and secretary elected by the members of the committee.

The duties of the committee should be as follows:

1. To make a general inspection of the whole plant at least once a month, and make a written report of the safety and sanitary conditions in and about the plant on forms furnished for that purpose.

2. To keep a record of all safety problems that come up in their respective departments from day to day, and to submit these reports to the committee at the weekly meetings for discussion.

3. To investigate all accidents and consider in each case methods of preventing a repetition. The result of this investigation to be made in writing to the safety department.

4. To caution and warn fellow-workmen against unsafe practices, and to report to the foreman any cases where a fellow-workman does not heed the warning given.

5. To help enforce all safety rules and regulations.

6. With the assistance of the foreman, to eliminate all unsafe practices without recourse to red tape.

7. To be free to pass to any part of the plant without other authority than the "safety committee badge" when the nature of the safety work so requires.

These several duties and privileges will give each member of the shop safety committee the feeling of independence so essential to a whole-hearted effort on his part to produce the results desired.

Comments by Members of the Committee

All three articles in the January issue appeal to me and I believe that most of us will find some good points in each article. The reason I choose No. 450 is because I gained more from that one than from the others. In results attained in accident prevention, we are going to win many, many times if we adopt the policy and tact which the writer of No. 450 outlines for us. It does not seem to me that a safety man can "sell" his ideas or obtain his results in the same way that the foreman can. So the solution for the safety man is to put himself in the other man's place and thereby get his co-operation.

The failure of most of our safety campaigns is due to a lack of appreciation of the employes' point of view. I vote for No. 450 as outlining one of the best means of getting beneath the surface with The Man On The Job.

To my mind the theme of No. 452 is a challenge to the small employers to take their proper place in the country-wide accident prevention program. It is true that the large companies and corporations of the country have led in accident prevention work, but there is no logical reason why they should continue to do so. Possibly the lump figure which accidents cost the larger plants each year is more staggering than the proportionately larger figure of the small companies and for this reason more decisive action has been taken by the large plants. The figures quoted in No. 452 show that the cost per unit is higher in a small plant than in a large one. This alone should serve as a stimulus to the small employers to get onto their job. My vote for first place is No. 452.

No. 451 deals with a subject familiar to every safety engineer and the material is presented in an interesting way.

In my opinion the first prize should be awarded to No. 450. I do not agree that the co-operation of the employer is a secondary matter, as there is no reasonable excuse for not having the full co-operation of the employer in the support of the safety movement; but I do concur with him in that it is necessary to use tact and diplomacy in handling the workman. The illustration of the "post graduate" is very good.

I vote for No. 450. The co-operation of the skilled mechanic must be secured in the promotion of a system of accident prevention. The safety engineer must take the workman into his confidence, and the only way to do this is to encourage him to talk and express his views as to how things should be done, as the machine he operates is his baby or sweetheart. There are few mechanics who do not take pride in the machines they operate and dress them up in cleanliness as the teamster used to keep old Dobbin dressed up in a clean harness and ivory rings. If ideas of workmen be crude, they can be polished up by the

Prizes for January Articles

First Prize. No. 450. *Frederick P. Porter, Inspecting Engineer, The Travelers Insurance Co., New York, N. Y.*

Second Prize. No. 451. *C. A. Briggs, Safety Director, Willys Overland Co., Toledo, Ohio.*

Honorable Mention. No. 452. *Franklin D. Warren, Resident Safety Engineer, Liberty Mutual Insurance Co., Providence, R. I.*

safety engineer and the credit for the whole scheme given to the workmen. I also agree with the writer of No. 450 that the chesty safety engineer, who carries all his knowledge under his shirt bosom, will have to loosen that garment at the neck, so that some of it will ooze up to a point where it will stimulate his thinker and be of more use to the workman. The thinking mechanic of today includes safety in his studies and wants facts and not too many theories.

Columbus City Hall Was Combustible

Photo from Underwood & Underwood, N. Y.

REMAINS OF THE CITY HALL AT COLUMBUS, OHIO, AFTER THE FIRE OF JANUARY 14, 1921

THE picture shows the top floor, which was a gymnasium, the morning after the fire. The entire structure, described as magnificent, was reduced to ashes and debris. A widespread conflagration was narrowly averted, as the fire department had difficulty in saving neighboring buildings. In fire restrictive construction public buildings of all sorts should be examples for the common people to follow. The Columbus City Hall, manifestly, was not such an example. It remains to be seen what the capital city of Ohio will do when a new building is erected to take the place of the one destroyed. Ohio statesmen stand high in the affairs of the Nation. The municipal authorities of Columbus now have an opportunity to show the people how public buildings can be built so as not to burn, at least disastrously.

Public buildings, many of them containing priceless records, burn every month in the year. In this class of property city halls, town halls and village halls appear to top the list.

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy loss by fire and in saving lives.

PUBLIC BUILDINGS

December 27, 1920. Chicago, Ill. Building at 17-25 West Elm street. Engineering and appraisers' offices. One 4-story building damaged. Walls, brick. Floors, wood. Roofs, gravel on trusses. Cause, cigarette stub in dumbwaiter shaft. Discovered by occupants at about 4.40 p. m. Alarm, street box. Duration, about 1½ hours. Stopped at third floor. Private fire apparatus, chemical extinguishers. Persons in building, 12. Killed, 1. Injured, 2. Means of escape, inside stairs and fire escape. Value of building and contents, $125,000. Property loss, about $25,000.

November 6, 1920. Halifax, N. S. City Hall. Offices fire alarm headquarters and police station. One 4-story building damaged. Walls, stone. Floors, wood. Roofs, slate, tar and gravel. Cause, high voltage wires coming in contact with fire alarm wires. Fire started, third floor. Discovered by passerby about 9 p. m. Alarm, telephone. Duration, 45 minutes. Confined to lathing and switchboard. Firemen handicapped by dense smoke and delay in getting alarm. Private fire apparatus, standpipe. Persons in building, janitor and family of 7, 6 policemen on ground floor. Killed, none. Injured, none. Means of escape, doors. Value of building and contents, $300,000. Property loss, slight.

September 23, 1920. Cheyenne, Wyo. State Capitol. One 4-story building damaged. Walls, stone. Floors, wood. Roofs, copper and slate. Cause, spontaneous combustion. Fire started in coal bunkers. Discovered by watchman at about 3.40 p. m. Alarm, telephone. Duration, about three hours. Fire was retarded by cement construction over coal bunkers. Private fire apparatus, hose, standpipes, chemicals inside. Persons in building, about 500. Killed, none. Injured, none. Means of escape, front, rear and side exits. Value of building and contents, $750,000. Property loss, slight.

July 31, 1920. North Bessemer, Pa. Carnegie Library, Main street. Public Library. One. 1½-story building damaged. Walls, brick. Floors, oak. Roofs, tile. Cause, lightning ignited gas. Fire started in basement. Discovered instantly. Duration, 1 hour. Stopped at attic. Confined to building. Private fire apparatus, extinguishers and garden hose. Persons in building, 10. Killed, none. Injured, none. Value of building and contents, $10,000. Property loss, $1,000.

March 15, 1920. Raleigh, N. C. Administration building of State prison. One 4-story building damaged. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started, in tower. Discovered by prisoner at about 3 o'clock. Alarm, telephone. Duration, 3 hours. Stopped at third floor. Firemen handicapped by laying lines across railroad track. Private fire apparatus, none. Value of building and contents, $60,000. Property loss, $15,000.

March 9, 1920. Philadelphia, Pa. Receiving room of United States Mint. One 3-story building damaged. Walls, stone. Floors, cement. Roofs, tin. Cause, gas explosion. Fire started, melting room basement. Discovered by employe at about 3.45 p. m. Alarm, telegraph. Duration, 1 hour. Stopped at basement. Private fire apparatus, extinguishers. Persons in building, unknown. Killed, none. Injured, 1. Means of escape, towers. Property loss, not reported to SAFETY ENGINEERING.

February 29, 1920. Lebanon, Mo. Laclede County Court House. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, slate and tin. Cause, unknown. Fire started in court room. Discovered by passerby at about 4.30 p. m. Alarm, telephone. Duration, 1 hour. Stopped at ground. Fire was favored by construction. Firemen handicapped by light water pressure. Private fire apparatus, none. Value of building and contents, $80,000. Property loss, $80,000.

February 19, 1920. Augusta, Ga. Richmond County Court House. One 3-story building damaged. Walls, brick, stucco finish. Floors, wood. Roofs, tin. Cause, unknown. Fire started in Judge Black's office, on second floor. Discovered by employe at about 8.45 p. m. Alarm, Gamewell box. Duration, 2 hours. Stopped in tower on roof. Fire was favored by construction of building. Private fire apparatus, none. Means of escape, 4 stairways. Value of building and contents, $200,000. Property loss, slight.

January 6, 1920. Sturgeon Lake, Minn. Village hall. One 2-story building damaged. Walls, wood. Floors, wood. Roofs, shingle. Cause, defective chimney. Fire started in attic. Discovered by smoke from bell tower about 11

a. m. Alarm given by people. Duration, 2 hours. Stopped when building was completely burned. Firemen handicapped by frozen chemical. Private fire apparatus, bucket brigade. Persons in building, none. Killed, none. Injured, none. Means of escape, wide stairway. Property loss, $500.

OFFICE BUILDINGS

December 28, 1920. Lansing, Mich. Prudden Office Building, 100-102 South Washington avenue. Bank and office building. One 6-story building damaged. Walls, brick and frame. Floors, wood. Roofs, tar and gravel. Cause, probably spontaneous combustion. Fire started in basement. Discovered by persons in A. D. T. office, across the street, at about 4.50 a. m. Alarm, A. D. T. Duration, 7 hours. Stopped when building was destroyed. Fire was favored by construction of building. Private fire apparatus, 1½ in. hose lines on each floor. Two firemen slightly injured. Means of escape, fire-escape in rear. Value of building and contents, $336,200. Property loss, $279,040.

October 5, 1920. New Orleans, La. Office building, 840 Common street. New Orleans Transfer Company and law offices. Two 3-story buildings damaged. Walls, brick. Floors, wood. Roofs, slate. Cause, unknown. Fire started on second floor. Discovered by police at about 3.15 a. m. Alarm, city box. Duration, 3¼ hours. Stopped in building where fire started. Private fire apparatus, none. Value of building and contents, $100,000. Property loss, $7,300.

September 25, 1920. St. Louis, Mo. Victoria Building, Eighth and Locust streets. Office building. One 10-story building partially destroyed. Walls, brick. Floors, wood. Roofs, composition. Cause, incendiary. Fire started in waste paper on tenth floor. Discovered by man who set it afire (who was simple-minded) at about 7.17 a. m. Alarm, still alarm. Duration, 4 hours. Fire was retarded by fireproof construction. Private fire apparatus, 3-gallon chemical and inside standpipe. Persons in building, 10. Killed, none; injured, none. Means of escape, fire-escape. Value of building and contents, $485,000. Property loss, slight.

July 29, 1920. Kansas City, Mo. Elevator tower of Lathrop Building, 10th and Grand streets. Office building. One 8½-story building damaged. Walls, concrete, steel and brick. Floors, concrete. Roofs, concrete. Cause, electric wiring defective. Fire started in elevator room on roof. Discovered by elevator operator about 4.55 p. m. Alarm, telephone. Duration, 2 hours and 30 minutes. Confined to building. Fire was retarded by fireproof construction of building. Private fire apparatus, none. Means of escape, stairway, elevators and fire-escape. Value of building $600,000. Property loss, $66,681.

June 7, 1920. Skowhegan, Me. Merrill block in Water street. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in basement. Discovered by smoke outside, at about 4.50 a. m. Alarm, box. Duration, 3½ hours. Stopped at second floor. Fire was retarded by modern construction of building. Private fire apparatus, none. Means of escape, fire-escape outside. Value of building and contents, $80,000. Property loss, $25,000.

April 3, 1920. Ashtabula, Ohio. Business block, 184 Main street. Mercantile and offices. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, defective wiring. Fire started under stairway on second floor. Discovered by man in an office at about 10.34 a. m. Alarm, telephone. Duration, 3 hours. Stopped at second floor. Fire was favored by construction of building. Firemen handicapped by low water pressure. Private fire apparatus, none. Means of escape, 2 fire-escapes. Value of building and contents, $116,750. Property loss, $37,980.

March 2, 1920. Greensboro, N. C. McAdoo Building, South Elm street. Office building. One 5-story building damaged. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, waste samples of cotton. Fire started in cotton samples. Discovered by passerby at about 1 p. m. Alarm, Gamewell. Duration, about 20 minutes. Stopped near point of origin. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, about 20. Means of escape, stairway and elevator. Value of building and contents, $150,000. Property loss, slight.

February 6, 1920. Lansing, Mich. Prudden Building, Michigan and Washington avenues. Banking house and office building. One 6-story building damaged. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, electric iron left with current turned on. Fire started in tailor shop on fifth floor. Discovered by some occupant of building about 8.10 p. m. Alarm, telephone. Duration, 1 hour, 45 minutes. Stopped at sixth floor. Fire was favored by wooden floors, wooden trim and nature of contents. Private fire apparatus, none. Value of building and contents, $166,500. Property loss, $19,017.

February 1, 1920. Syracuse, N. Y. Griffin Square Building. Stores and offices. One 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tar. Cause, unknown. Fire started in basement. Discovered by passerby about 3.01 p. m. Alarm, telephone. Duration, 5 hours. Stopped at first floor. Fire was favored by construction of building. Private fire apparatus, none. Means of escape, stairway. Value of building and contents. $150,000. Property loss, $50,000.

January 24, 1920. Augusta, Ga. General office of Georgia Railroad at Union railway station. One 3-story building damaged. Walls, brick. Floors, tile. Roofs, slate. Cause, unknown. Fire started in third floor. Discovered by employes at 2.35 p. m. Alarm, Gamewell system. Duration, 2½ hours. Stopped at second floor. Fire was favored by construction of building. Private fire apparatus, none.

Several firemen overcome by smoke. Means of escape, iron ladder fire-escapes. Value of building and contents, unknown. Property loss, not reported to SAFETY ENGINEERING.

January 6, 1920. Dallas, Texas. North Texas Building, 905-911 Main street. Office building. Part of second and third floors of 6-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started on second floor. Discovered by policeman on beat about 4.30 a. m. Alarm, Gamewell box. Duration, 1 hour. Stopped at third floor. Fire was favored by wooden construction of building. Firemen handicapped by fire being in the rear; firemen had to go over the top of other buildings and break through the basement. Private fire apparatus, none. Persons in building, one night watchman. Value of building and contents, $256,275. Property loss, $31,500.

January 1, 1920. Mayville, N. D. Farmers' Bank Building. Main street. Bank and offices. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, furnace explosion. Fire started in basement. Discovered by smoke from open window about 7.15 p. m. Alarm, party calling power house and whistle. Duration, 9 hours. Stopped in building. Fire was retarded by brick walls, kept confined except for window openings. Firemen handicapped by extreme cold weather and coal piled against the door of basement entrance. Private fire apparatus, none. Means of escape, front stairs only. Value of building and contents, $120,000. Property loss, about $38,000.

The building had windows on all sides, with no shutters. Rear door of basement had been piled up with a supply of coal, and there was no way of getting at fire from front entrance, owing to dense smoke and location of stairs leading to the basement. Valuable papers were saved by being in vaults and safes.

HOTELS AND LODGING HOUSES

January 9, 1920. Presque Isle, Me. Columbia Hotel. State street. Hotel. One 4-story building destroyed. Walls, wood. Floors, wood. Roof, shingles. Cause, heating plant. Fire started in basement. Discovered by night clerk at about 1:45 a. m. Alarm, Gamewell System. Duration, 3 hours. Stopped in same building. Fire was favored by all frame construction. Private fire apparatus, none. Persons in building, 30. Means of escape, 1 fire escape. Value of building and contents, $30,000. Property loss, $20,000.

December 10, 1919. Wurtsboro, N. Y. Pine Rest, Yankee Lake, N. Y. On main road. Boarding house. One 3-story and one 1-story building destroyed. Cause, back fire in furnace. Fire started in cellar. Discovered when smoke was seen on upper floor at about 6 p. m. Alarm, telephone. Duration, 1 hour. Stopped when everything was destroyed. Fire was favored; building constructed mostly of wood. Firemen handicapped because there was no way to reach building with apparatus; also heavy wind prevailed. Bucket brigade only could work. Private fire apparatus, extinguishers. Persons in building, 1. Value of building and contents, $40,000. Property loss, not reported to SAFETY ENGINEERING.

THEATERS AND AMUSEMENT PLACES

July 4, 1920. Creston, Iowa. Masonic Temple and Masonic Theater. Mills and Oak streets. Masonic Temple and motion picture theater. Two 3- and 2-story buildings partly destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, electric wires. Fire started in property room. Discovered when cracking noise was heard at about 11:10 p. m. Alarm, telephone. Duration, several hours. Stopped at ground floor. Fire was favored by construction. Firemen handicapped by fire being impossible to get at. Private fire apparatus, none. Persons in buildings, 2. Means of escape, doors and fire escapes. Value of building and contents, $175,000. Property loss, $150,000.

July 22, 1920. Monroe, La. Dancing pavilion. River front. One 1-story and basement building damaged. Walls, wood. Floor, wood and joist. Roof, wood shingles. Cause, unprotected gas stove. Fire started in drying room for bathing suits. Discovered by life guard at about 4:15 p. m. Alarm, telephone. Duration, 2 hours. Fire was favored by frame construction. Private fire apparatus, none. Persons in building, 3. Value of building and contents, $15,000. Property loss, $7,000.

September 15, 1920. Mankato, Minn. At head of 1st avenue. Fair Association. One row of horse sheds about 12 stalls, 1-story high, destroyed. Walls, wood. Floor, dirt. Roof, wood shingles. Fire started in unoccupied stall. Discovered by fair officials, who saw fire from distance, at about 9:30 p. m. Alarm, telephone. Duration, ¾ hour. Stopped at three-quarters of the way down row of stalls. Fire was favored by flimsy construction; filled with straw, hay, etc. Firemen handicapped by having to lay 2,000 feet of hose; barns practically destroyed when department arrived. Private fire apparatus, several 2½-gallon chemicals. Value of building, $500. Property loss, $400 on building; $1,500 race horse burned to death. The fire chief reports to SAFETY ENGINEERING: "Several race horses were scorched, none seriously. Fire was discovered when it involved 3 stalls. After discovery it was necessary to go ¼ mile to telephone alarm. Fire apparatus had to run 2 miles to grounds and when it arrived one horse had been burned. Sheds were old and in poor condition and consisted of fence for rear and boarded up fronts with doors and partitions between stalls."

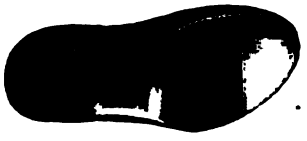
Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

ALUMINUM SHOES FOR WORKINGMEN

An aluminum shoe, made to answer the need of a comfortable, long-wearing shoe for factory workers, which is a real foot protection against dampness or injury from stepping on nails, is being marketed by the Overland Shoe Company, of Racine, Wis.

The shoe is remarkably light and easy on the feet. It will not cause the feet to perspire, is cool in summer and warm in winter. Men who work on damp floors, in steel mills, foundries, and in fact all classes of factories



where ordinary shoes are soon knocked out, will appreciate this aluminum shoe.

A special feature of the Overland shoe is the "Cordo" sole, which is inserted across the bottom of the aluminum sole, thus forming a cushion which prevents the shoe from slipping easily on hard, smooth surfaces. Notice this in the accompanying illustration.

As a means of keeping the feet in comfortable, healthy condition, this shoe deserves consideration. It will wear for years, and is an economical shoe to buy for that reason, besides the health protection which it provides.

SPRINGFIELD GAINS

The annual statement of the Springfield Fire and Marine Insurance Company, of Springfield, Mass., which is published in full on another page, shows remarkable increases in those items which indicate prosperity and growth.

The total assets of $20,374,875 show an increase of $3,071,738, and the net surplus of $4,033,417 is an increase of $54,506.

The increase of premiums written amounts to $3,398,344, making the total $13,618,836; while the Reinsurance Reserve of $11,368,661 means an increase of $2,219,384.

This state of business should be most gratifying to A. W. Damon, the president, and George G. Bulkley, the vice-president of the company, as it is evidence not only of their ability but of their personal popularity.

A NEW HOUSE ORGAN

We have received No. 1, Vol. 1, of the *Carrier*, which will be published monthly by the Employers' Mutual Insurance Company of New York. The editor of this new publication is John M. Bessey, and he starts at a gait which we hope he will be able to maintain. The contents of this publication are interesting and it is notable for its entire absence of clippings from others.

"INDUSTRY" FOR JANUARY

Frank D. Chase, Inc., Chicago, publication *Industry* for January, 1921, contains a number of interesting articles, among which there is one by Frank D. Chase, "The Employer's Analysis of an Engineer." Mr. Chase places loyalty first, with personality as a second classification, experience third, and education fourth, all of which are essential. "The method of getting the education," he says, "is of little account, but it must be gotten some way." L. M. Hansen's article, "How to Get a Foundry That Fits," includes valuable information, typical layouts for malleable, gray iron and steel foundries, with dimension of yards, melting equipment, molding area and core rooms. Other interesting articles are included in the 32 pages of this house organ, a copy of which we are sure may be had if desired.

AN AUTOMATIC FIRE ALARM—SELF-CONTAINED

Fireklok is a new addition to the really dependable fire alarms. It is entirely self-contained, requiring a space only five inches in diameter on a wall or pillar to make it fully operative.

Its principle is the automatic clanging of a resonant gong, which begins when the temperature of the room rises to 160 degrees. The control is a fusible link, made of a metal which must melt and become liquid at 165 degrees. When dwelling on the dependability of this fuse melting, the Fireklok manufacturers claim that the United States Government has found its melting point infallible. In fact, it

is used in Washington for testing government thermometers.

Because the fuse melts at this low degree, the Fireklok alarm is given while the fire is in its incipiency and can be put out by hand extinguishers. Once the alarm starts, it rings insistently for five full minutes, demanding the attention of all ears within a large radius. After use the Fireklok is made ready for duty again by simply replacing the old fusible link with a new one.

These alarms are usually placed in the most strategic points where fire is most liable to occur. In a dwelling, the cellar and kitchen seem to be the most logical places, though other structures have other points to guard.

Readers of SAFETY ENGINEERING may get more details regarding Fireklok by writing to the manufacturers, the Pyrene Manufacturing Company, who also make Pyrene Extinguishers and other fire appliances.

CROUSE-HINDS FLOODLIGHTS

We have received Bulletin No. 304-A, dated December 15, 1920, and descriptive of Crouse-Hinds Imperial Floodlight Projectors and Imperial Reflectors. These have a very wide use in industrial plants and contribute in every case to the general cause of safety. The illustrations in the bulletin under consideration show the use of these lights in unloading ore in a steel plant, the illumination for engine round houses, outdoor construction work and for dock use in loading and unloading vessels. The bulletin is a complete consideration of the subject and should be in the library of every safety engineer who has or is liable to have use for this type of lamp.

A PRETENTIOUS PLANT PAPER

The January issue of *Solvay Life* is one of the most elaborate of plant journals and is published monthly in the interest of employes of seven associated plants. The paper seems to be everything that such a publication should be and might be commended as a model, although it is in a form which is probably more elaborate than most companies would care to undertake. The cover is an original drawing by Redmond in four colors, the leading figure on which bears a strong family resemblance to Mr. Redmond's "Safety Annie," probably her brother.

ADAMSON NOW MAKES TANKS AND ARC WELDED PRODUCTS

The Adamson Manufacturing Company, East Palestine, Ohio, have added a new department for manufacturing all kinds of storage, pneumatic and pressure tanks, welded pipe, battery casings, evaporators, condensors and a large line of arc-welded products.

NEW CONDULETS

The Crouse-Hinds Company, of Syracuse, N. Y., certainly do get out attractive circulars whenever they have a new condulet message. We are now in receipt of one entitled "These Are What We Should Use," and it describes condulets GG, FS, GSC and Two-Gang FS. This series of condulets are made with vapor-proof switch covers and are for use in positions subjected to corrosive fumes, also where vapor gas, dirt and moisture might affect the installation.

The continued increase in the types of condulets justifies the claim of the manufacturer that "there is a condulet that exactly fits your need every time you are called upon to provide an outlet in the conduit system."

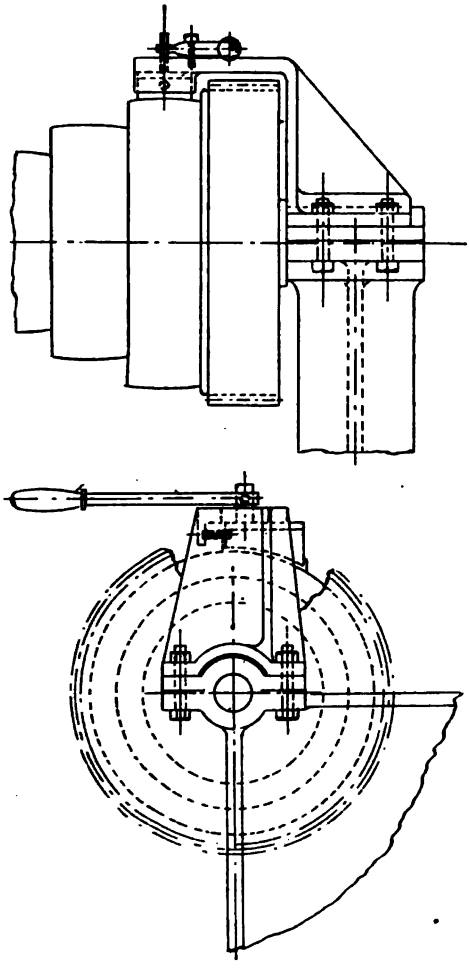
GLOBE-WERNICKE "DOINGS"

The above is the title of a very attractive house organ issued by the Globe-Wernicke Company, of Cincinnati, Ohio. This particular publication seems to be designed not so much for the employe as for the dealer in this company's products, which contains news of dealers in various towns, also helps for merchandising and is prepared with care and editorial ability.

THE FAUST LATHE BRAKE

A dangerous custom, more or less general among lathe operators, is that of using the left hand to stop the rotation of the lathe pulley when the lathe driving belt is shifted to the idler.

A stick of wood is often used between the pulley and its supporting framework, but it is with a desire to furnish adequate mechanism for this purpose that Ephraim M. Faust, of Steelton, Pa., has recently taken out letters patent on an ingenious device here shown.



This brake bolts on the front spindle cap and operates on the large cone between the belt surfaces so as not to interfere with the operation of any part of the lathe.

The brake is composed of only six parts. Is very simple, compact, easily attached and most sturdy.

The operator, after throwing off the power, takes hold of the lever and by exerting a little pressure, the shoe on the brake grips the cone and stops the lathe instantly. A spring inserted in the shoe releases the brake the moment the operator lets go of the lever. It snaps out of contact with the cone, ready for the next braking operator.

This brake, as may be seen, removes the risk to the operator which is attendant upon his braking by the palm of his left hand and prevents any possibility of getting caught in the belt or machine.

The inventor believes that the increase in production, due to the use of this brake, is about 8 per cent, as the operator has such perfect control over the movements of the lathe.

The Department of Labor and Industry, State of Pennsylvania, have already issued an approval of this brake, and plans for its commercial manufacture are in progress.

THE AERO AUTOMATIC FIRE ALARM

A very interesting consolidation of interests is shown in the recent advertising of the American District Telegraph Company which announces its control of the Aero Automatic Fire Alarm. This system is actuated by the sudden rise of temperature rather than by the degree of heat attained, so that it will act as quickly in a cold storage plant as in the adjoining boiler room. The essential element of the Aero System will be remembered as a copper tube of almost capillary fineness and having all the appearance of a solid copper wire. The expansion of air within this tube is the actuating principle which gives the alarm.

It is claimed that Aero is the only automatic fire detecting device which can be fully tested in a few minutes' time so as to know that the entire fire-finding equipment throughout the premises is in order and so adjusted as to respond to the desired heat conditions.

GOOD LIGHTING

A very interesting series of folders has been sent out by the Edison Lamp Works, all of them preaching the lesson which we have been trying to emphasize, that increased production and added safety are secured by better lighting. These circulars tell nothing new, but they dress it up in wonderfully attractive style, the subject matter being for the most part hitched on to some classical allusion.

ESTEY SPRINKLERS MOVE

We are in receipt of a notice of removal from the H. G. Vogel Company, stating that on and after February 1, 1921, their address will be 15 West 36th street, New York City, and that the executive offices of the company will be maintained there.

GOOD VENTILATION NOT A LUXURY—A NECESSITY

"Impure air plays a very important part in occupational diseases and the evil effects of insufficient ventilation are especially alarming. If there is an absence of fresh air in such places, coupled with unsanitary plumbing or injurious dust and fumes, conditions are dangerous. *Good ventilation is therefore not a luxury. It is a necessity,* and by increasing industrial efficiency, preventing disease, and consequent loss to the employer, it more than warrants the investment and is really an insurance against inefficiency and illness.

"Infectious diseases prevalent among wofkmen in shops are known to factory inspectors as due frequently to unsanitary conditions. The economic value of pure air should be recognized by the factory owner and his investment in ventilators would bring returns more than warranting the original outlay.

"In Massachusetts and other States a fresh air supply of 30 cu. ft. per person per minute is required by law.

"An automatic roof ventilator, whether of the stationary or rotating type, is a device designed to produce or accelerate the flow of air from an enclosure, but the vitally important fact is not generally known, or very frequently forgotten, that some means of ingress for the air must be provided, in addition to the mechanical device for egress.

"The rotating type of ventilators, either with fixed heads and rotating elements; with fixed vanes and elements, and with heads pivoted to swivel with wind currents, or having both pivoted heads and rotating elements, are constructed with a view to accelerate the flow of air through the ventilator. It was generally believed that rotating ventilators were superior in exhaust capacity to the stationary type, but Government tests showed a very great variation in the exhaust capacity of different types of rotating ventilators, and also showed a large number of stationary ventilators much more efficient than certain rotating types.

"Since it is a matter of public knowledge that the 'Star' type of ventilators manufactured by the Merchant & Evans Co., Philadelphia, was adopted by the Construction Division of the United States Army, as the Government Standard, to be used on cantonment construction during the period of the war, on account of the simplicity of its construction and efficiency, and likewise because of its economical cost, it is officially permitted to state that an efficiency test was made of various kinds of ventilators, and on the basis of efficiency the list was divided into four classes; the 'Star' ventilators coming in the first class."

The foregoing is abstracted from an interesting booklet issued by the Merchant & Evans Co. and the illustrations are those of typical installations

"Star" Ventilators on the plant of the Pittsburgh Screw & Bolt Co., Pittsburgh, Pa.

Another view of the Pittsburgh Screw & Bolt Co.'s "Star" Ventilator equipment.

"DEWATERS SAFETY BOILER LATCH"

Although one of the first of the modern industrial hazards, the steam boiler remains a menace in spite of the many improvements in design and construction which have been made.

The failure of a tube cannot always be foreseen and its consequences must be guarded against.

The DeWaters Safety Latch Company of Far Rockaway, N. Y., have devised a safety boiler latch which is proving increasingly popular as evidenced by the lengthening list of prominent users. This form of protection is trivial in cost by comparison with the compensation costs it may save and owners of boiler plants should investigate its merits.

"ANGLMESH" GUARDS

The Orr Machine Guarding Company of Trenton, New Jersey, will tell you before you start, just how much it will cost you to equip your plant with the "Anglmesh" guards they make.

The advance estimate includes the design of the guards, their construction, their erection in your plant and the securing of the approval of them by the state authorities. This plan certainly relieves the plant owner and his safety engineer of many annoying details.

UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

AUTOMATIC SWITCHES—PRESSURE OPERATED TYPE—National Utilities Corp., Submittor, Milwaukee, Wis.

BATTERY SETS—Stanley & Patterson, Inc., Mfr., West and Hubert Sts., New York, N. Y.

BELLS—Stanley & Patterson, Inc., Mfr., West and Hubert Sts., New York, N. Y.

BOXES—CONTROL PANELS AND SINGLE-STROKE GONGS FOR NON-AUTOMATIC FIRE ALARM SYSTEMS—Stanley & Patterson, Inc., West and Hubert Sts., New York, N. Y.

CABINETS AND CUTOUT BOXES—SHEET METAL—Western Safety Mfg. Co., Inc., Mfr., 247 Minna St., San Francisco, Calif.

CARTRIDGE ENCLOSED FUSES — RENEWABLE—Chase-Shawmut Co., Mfr., Newburyport, Mass.

CARTRIDGE ENCLOSED FUSES—NON-RENEWABLE—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

CARTRIDGE FUSE CUTOUT BASES—Economy Fuse & Mfg. Co., Submittor, Greenview Ave. and Diversey Pkwy., Chicago, Ill.

CARTRIDGE ENCLOSED FUSES—NON-RENEWABLE—Interstate Electric Co., Inc., Mfr., 420-26 Carroll St., New Orleans, La.

CARTRIDGE FUSE CUTOUT BASES—Freeman Electric Co., E. H., Mfr., Trenton, N. J.

CHEMICAL EXTINGUISHER, 2½ GAL., ANTI-FREEZE TYPE—Canadian Foamite Firefoam Co., Ltd., Submittor, Hamilton, Ontario, Can.

CLASS A BUILT-UP GRAVEL OR SLAG SURFACED ROOF COVERINGS—Standard Paint Co., The, Mfr., 95 Madison Ave., New York, N. Y.

CLASS C PREPARED ROOF COVERINGS—Standard Paint Co., The, Mfr., 95 Madison Ave., New York, N. Y.

CLASS C SHINGLE ROOF COVERINGS—Stowell Mfg. Co., Mfr., 244-64 Culver Ave., Jersey City, N. J.

CONDUIT BOXES—Sprague Electric Wks. of General Electric Co., Submittor, 527 W. 34th St., New York, N. Y.

CONDUIT BOXES—Stanley & Patterson, Inc., Mfr., West and Hubert Sts., New York, N. Y.

CONDUIT BOXES—Steel City Electric Co., Submittor, Pittsburg, Pa.

CONDUIT BOXES—Thomas & Betts Co., Submittor, 63 Vesey St., New York, N. Y.

CONDUIT BOXES—United Electrical Mfg. Co., Mfr., Adrian, Mich.

CONDUIT OUTLET BUSHINGS AND FITTINGS—V. V. Fittings Co., Mfr., Philadelphia, Pa.

CURRENT TAPS—Paiste Co., H. T., Mfr., 32nd and Arch Sts., Philadelphia, Pa.

ELECTRIC CARBONATORS—Mueller Mfg. Co., The Rud., Mfr., 4310 N. California Ave., Chicago, Ill.

ELECTROLYTIC OXYGEN AND HYDROGEN—Kentucky Oxygen & Hydrogen Co., Mfr., Louisville, Ky.

ELECTRO-MECHANICAL GONGS—Stanley & Patterson, Inc., Mfr., West and Hubert Sts., New York, N. Y.

EMERY WHEEL GUARD—Howe Safety Appliance Co., Mfr., 19th and D Sts., Granite City, Ill.

ENCLOSED SWITCHES—Allen-Bradley Co., Mfr., Milwaukee, Wis.

ENCLOSED SWITCH—Columbia Metal Box Co., 224-28 E. 144th St., New York, N. Y.

ENCLOSED SWITCHES—Johns-Pratt Co., The, Mfr., Hartford, Conn., Johns-Manville Co., The, H. W., Sole Agents, New York, N. Y.

ENCLOSED SWITCHES—Trumbull Electric Mfg. Co., The, Mfr., Plainville, Conn.

ENCLOSED SWITCHES — Trumbull-Vanderpoel Elec. Mfg. Co., The, Mfr., Bantam, Conn.

ENCLOSED SWITCH—Wadsworth Elec. Mfg. Co., Mfr., Covington, Ky.

ENCLOSED SWITCHES—Western Safety Mfg. Co., Inc., Mfr., 247 Minna St., San Francisco, Calif.

ENCLOSED SWITCHES—Westinghouse Elec. & Mfg. Co., Mfr., East Pittsburgh, Pa.

EXTINGUISHER, 2½ GAL. PUMP TYPE—Diener Mfg. Co., Geo. W., Mfr., 400 Monticello Ave., Chicago, Ill.

FITTINGS FOR CONDUIT BOXES—COVERS—Paiste Co., H. T., Mfr., 32nd and Arch Sts., Philadelphia, Pa.

FIXTURE FITTINGS—Non-Twist Canopy Ring Co. of Canada, Mfr., 34 St. Patrick St., Toronto, Can.

FIXTURES—Erikson Electric Co., Mfr., 6 Portland St., Boston, Mass.

FIXTURES—Johnson Co., The, Arthur, Mfr., 4802 Fullerton Ave., Chicago, Ill.

FIXTURES—SHOW WINDOW AND SHOW CASE TYPE—Viking Sign Co., Inc., Mfr., 617 Eighth Ave., New York, N. Y.

FLEXIBLE TUBING FASTENERS—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

FLEXIBLE TUBING FASTENERS—New Process Specialty Co., Mfr., 230 Hanover St., Milwaukee, Wis.

FLOOR OUTLET BOXES—Bonnell Co., W. A., Mfr., 192 Chambers St., New York, N. Y.

FLOOR OUTLET BOXES—Stanley & Patterson, Inc., Mfr., West and Hubert Sts., New York, N. Y.

GROUND CLAMPS—Conduit Fittings Co., The, Mfr., 411 S. Clinton St., Chicago, Ill.

GROUND CLAMPS—Utility Fittings Co., The, Mfr., 812 Walnut St., Philadelphia, Pa.

FUSELESS ATTACHMENT PLUGS — Bryant Electric Co., The, Mfr., Bridgeport, Conn.

FUSELESS ATTACHMENT PLUGS—Freeman Elec. Co., E. H., Mfr., Trenton, N. J.

FUSELESS ATTACHMENT PLUGS — General Electric Co., Mfr., Schenectady, N. Y.

GROUND CLAMPS—Fralick & Co., S. R., Mfr., 15 S. Clinton St., Chicago, Ill.

HANGERS, LAMP AND FIXTURE—Thompson Elec. Co., The, Mfr., 226 St. Clair Ave., N. E., Cleveland, O.

HARDWARE-SWINGING PATTERN-DOOR CLOSERS—Richards-Wilcox Co., Mfr., Aurora, Ill.

HOLLOW METAL FIRE WINDOW FRAMES—Miller Cornice & Roofing Co., Edward, Mfr., 1707-11 Market St., Tacoma, Wash.

INDUSTRIAL AND LABORATORY HEATING APPLIANCES—Landis Machine Co., Mfr., 1515-27 No. 25th St., St. Louis, Mo.

INDUSTRIAL AND LABORATORY HEATING APPLIANCES—Paasche Air Brush Co., Mfr., 1912-27 W. Washington Blvd., Chicago, Ill.

INSIDE POWER-OPERATED, DISCHARGE DEVICE—Catron Mfg. Co., Inc., Mfr., Bonham, Texas.

INSIDE HAND-OPERATED DISCHARGE DEVICE—Shotwell Pump & Tank Co., Mfr., 22 Parkman St., Brighton District, Boston, Mass.

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KNIFE SWITCHES—Barker Elec. Mfg. Co., Mfr., North Attleboro, Mass.

KNIFE SWITCHES—Oriole Elec. Mfg. Co., Mfr., South Norwalk, Conn.

LIGHTNING RODS—Diamond Cable Co., Mfr., Bourbon, Ind.

LINK FUSES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

MEDIUM BASE RECEPTACLES—Freeman Elec. Co., E. H., Mfr., Trenton, N. J.

MEDIUM BASE RECEPTACLES—Paiste Co., H. T., Mfr., 32nd and Arch Sts., Philadelphia, Pa.

MEDIUM BASE RECEPTACLES—Stanley & Patterson, Inc., Mfr., West and Hubert Sts., New York, N. Y.

MEDIUM BASE RECEPTACLES—Trumbull Elec. Mfg. Co., The, Mfr., Plainville, Conn.

MEDIUM BASE SOCKETS—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

MEDIUM BASE SOCKETS—Freeman Elec. Co., E. H., Mfr., Trenton, N. J.

MEDIUM BASE SOCKETS—Hubbell, Inc., Harvey, Mfr., Bridgeport, Conn.

MEDIUM BASE SOCKETS—Paiste Co., H. T., Mfr., 32nd and Arch Sts., Philadelphia, Pa.

MEDIUM BASE SOCKETS—Stanley & Patterson, Inc., Mfr., West and Hubert Sts., New York, N. Y.

MOGUL BASE SOCKET—Peerless Light Co., Submittor, Washington Blvd., Union and Meridian Sts., Chicago, Ill.

NON-AUTOMATIC FIRE ALARM SYSTEMS—Stanley & Patterson, Inc., Mfr., West and Hubert Sts., New York, N. Y.

OIL BREAK SWITCHES—Westinghouse Elec. & Mfg. Co., Mfr., East Pittsburgh, Pa.

OUTLET BUSHINGS—Nicholson Elec. Fittings Co., Mfr., Wilkes-Barre, Pa.

OUTLET BUSHINGS AND FITTINGS—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

OUTLET PLATES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

OUTLET PLATES—Collinson-Holland Co., Mfr., 253 Medford St., Malden, Mass.

OUTLET PLATE—Conduit Fittings Co., The, Mfr., 411 S. Clinton St., Chicago, Ill.

OUTLET PLATE—General Machine & Mfg. Co., The, Mfr., 544 Iranistan Ave., Bridgeport, Conn.

OUTLET PLATES—United Electric Mfg. Co., Mfr., Adrian, Mich.

OUTSIDE POWER-OPERATED, DISCHARGE DEVICE—Catron Mfg. Co., Inc., Mfr., Bonham, Texas.

PANELBOARDS—Mendell Mfg. Co., Inc., Mfr., Mattapoisett, Mass.

PANELBOARDS—Reid Dental Instrument Co., Inc., J. E., Mfr., 408 No. 12th St., Philadelphia, Pa.

PANELBOARDS—Wisconsin Electrical Mfg. Co., Mfr., 453 E. Water St., Milwaukee, Wis.

PICTURE MACHINE APPLIANCE—FILM REWINDER—Fulton Co., E. E., Mfr., 3258 Carroll Ave., Chicago, Ill.

PLUG FUSES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

PLUG FUSE CASINGS—Economy Fuse & Mfg. Co., Submittor, Greenview Ave. and Diversey Pkwy., Chicago, Ill.

PLUG FUSE CUTOUT BASES—Garvin & Co., Sam, Mfr., 5224 W. Lake St., Chicago, Ill.

PLUG FUSE CUTOUT BASES—Gordon Electric Mfg. Co., The, Mfr., Waterville, Conn.

PORTABLE RECORDERS AND KEY STATIONS—Hardinge Bros., Inc., Mfr., 4145 East Ravenswood Ave., Chicago, Ill.

PORTABLE RECORDERS AND KEY STATIONS—Newman Clock Co., Mfr., 487 Broadway, New York, N. Y., 567 W. Washington Blvd., Chicago, Ill.

PORTABLE STEAM STERILIZER—West Disinfecting Co., Mfr., 411 Fifth Ave., New York, N. Y.

RACEWAY FITTINGS—Paiste Co., H. T., Mfr., 32nd and Arch Sts., Philadelphia, Pa.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Freeman Electric Co., E. H., Mfr., Trenton, N. J.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—General Electric Co., Mfr., Schenectady, N. Y.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Hart & Hegeman Mfg. Co., The, Mfr., 342 Capitol Ave., Hartford, Conn.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Rosenburg & Co., Mfr., 305 E. 3rd St., Los Angeles, Calif.

RUBBER-COVERED FIXTURE WIRE—Phillips Wire Co., Mfr., Pawtucket, R. I.

SAFES (Class C)—Meilink Steel Safe Co., The, Mfr., Oakwood Ave., and L. S. & M. S. Tracks, Toledo, O.

SAFETY FILM—SLOW BURNING—Eastman Kodak Co., Mfr., Rochester, N. Y.

SERVICE ENTRANCE OUTLET BUSHINGS—Butte Elec. & Mfg. Co., Mfr., 534 Folsom St., San Francisco, Calif.

SHEET METAL FIRE WINDOW MULLIONS—Rysdon & Co., E. A., Mfr., 527 W. 41st St., Chicago, Ill.

SIGNAL APPLIANCES — MISCELLANEOUS — Amrevo Electric Co., Mfr., 2309 Archer Ave., Chicago, Ill.

SIGNALING SYSTEMS—Elevator Supplies Co., Inc., Mfr., 1515 Willow Ave., Hoboken, N. J.

SIGNALING SYSTEMS—Stanley & Patterson, Inc., Mfr., West & Hubert Sts., New York, N. Y., Electric Service Supplies Co., Sole Agents, 17th & Cambria Sts., Philadelphia, Pa.

SIGNS—American Sign Co., Mfr., Willard and Cooley Sts., Kalamazoo, Mich.

SIGNS—Federal Elec. Co., Sumittor, Federal Sign System (Elec.), Mfg., 91 New Montgomery St., San Francisco, Calif.

SLIDING OR SWINGING, SHEET METAL, FIRE WALL DOOR—Fire Protection Products Co., Mfr., 3117-19 20th St., San Francisco, Calif.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Green Bay Hardware Co., Mfr., 107-11 Walnut St., Green Bay, Wis.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Linck Sheet Metal Works, J. Edward Mfr., 2949-49 N. Marshall St., Philadelphia, Pa.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Overbeck, John, Mfr., 927 Leonard St., N. W., Grand Rapids, Mich.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Zink Lumber Co., East Aurora, N. Y.

STATIONARY RECORDER—Hardinge Bros., Inc., Mfr., 4145 East Ravenswood Ave., Chicago, Ill.

STATIONARY RECORDERS—Newman Clock Co., Mfr., 428 Broadway, New York, N. Y., 567 W. Washington Blvd., Chicago, Ill.

SURFACE SWITCHES—Hubbell, Inc., Harvey, Mfr., Bridgeport, Conn.

SWITCH BOXES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

SWITCH BOXES—Collinson-Holland Co., Mfr., 253 Medford St., Malden, Mass.

SWITCH BOXES—Steel City Elec. Co., Mfr., 1207 Columbus Ave., Pittsburgh, Pa.

SWITCH BOXES—Yale Mfg. Co., The, Mfr., 16 St. Clair Ave., N. W., Cleveland, O.

UNDERGROUND STORAGE TANKS—Bass Foundry & Machine Co., The, Mfr., 1602 Hanna St., Fort Wayne, Ind.

UNDERGROUND STORAGE TANKS—Bowser & Co., Inc., S. F., Mfr., Fort Wayne, Ind., Branch Assembly Plant, 1013 Broadway, Albany, N. Y.

UNDERGROUND STORAGE TANKS — Lucius Mfg. Co., Mfr., 9th St. and Robin Ct., Canton, Ohio.

WATER STERILIZER—Clow & Sons, James B., Mfr., 544 S. Franklin St., Chicago, Ill.

WELDING AND CUTTING BLOWPIPES OR TORCHES—Burdett Oxygen Co., Mfr., 52nd and Santa Fe Aves., Los Angeles, Calif.

WELDING AND CUTTING BLOWPIPES OR TORCHES—Victor Oxy-Acetylene Equipment Co., Mfr., 884-86 Folsom St., San Francisco, Calif.

WELDING AND CUTTING BLOW-PIPES OR TORCHES—Imperial Brass Mfg. Co., Mfr., 1200 W. Harrison St., Chicago, Ill.

WELDING MACHINES—Allan Mfg. & Welding Corp., Mfr., Buffalo, N. Y.

WIRES—SLOW-BURNING—Phillips Wire Co., Mfr., Pawtucket, R. I.

WIRES—SLOW-BURNING—Rockbestos Products Corporation, Mfr., New Haven, Conn.

WIRES—WEATHERPROOF—American Insulated Wire & Cable Co., Mfr., 21st, Sangamon and Morgan Sts., Chicago, Ill.

WIRES—WEATHERPROOF—Phillips Wire Co., Mfr., Pawtucket, R. I.

WOODEN RACEWAY FITTINGS—Stanley & Patterson, Inc., Mfr., West & Hubert Sts., New York, N. Y.

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The Gasoline Holocaust in Memphis, Tenn.

Photo from Underwood & Underwood, N. Y.

View of the wreckage in Memphis, Tenn., after the explosion of a gasoline tank car and the conflagration that followed. Thirteen persons were killed and 18 injured. A report by Colonel B. W. Dunn, Chief Inspector of the Bureau of Explosives, says: "The Memphis accident brings forcibly to our attention, once more, the general hazards of gasoline and the danger involved in having large gasoline plants located so close to the main lines of railroads and to inhabited dwellings. THE COUNTRY IS FULL OF SUCH HAZARDS AND IT IS IMPOSSIBLE NOW TO ELIMINATE THEM."

(*See page* 127)

Goggles for Locomotive Enginemen

By Gustave J. Soderberg,

Industrial Sanitary Inspector, New York City Department of Health

A "SAFETY FIRST" or "Health First" policy in an organization should function in such a manner as to inspire the confidence of the worker. Only when no obstacle is placed in the path of a clear understanding by the worker of such a movement and an intelligent consideration given to his suggestions to remedy conditions concerning which he is most familiar will the resultant effect be a gratifying one.

Absolute recognition of all the health hazards in connection with any employment is the one policy that will accord to the worker the full measure of attention and protection to which he is entitled, as well as command his respect and co-operation.

Would it not be fair to assume that this matter has a direct bearing upon good-will, the one invisible asset many times not reckoned as an integral part of the foundation of human relations?

Much may be said of the many factors which touch upon labor turnover. But with what degree of certainty may one determine the cause of an employe leaving voluntarily, or the justification of the employer dispensing with a worker's services?

Since the time the Federal authorities assumed control of the railroads during the war emergency and required every first class railroad to maintain (if not already installed) a safety department, many employes of the railroads have received the first intimation regarding safeguarding their health. At this time the results of classifying the occupations of those registered under the Selective Service Draft was being carried out, which showed that only 38 journeymen and 102 apprentice locomotive firemen were discovered in each 10.000 so registered. This certainly proves that such classes of railroad workers are both valuable and rare, especially so in time of impending emergency.

Many locomotive firemen have become acquainted with men who at the time of physical examination for promotion to engineer were not passed by the company doctor on account of defective vision and observed their turning away from the company gates to seek anew (physically handicapped) some form of work wherein a human industrial byproduct may engage himself in remunerative employment (invariably at a rate of compensation lower than what he formerly enjoyed).

With the ever-increasing demand for more power through increased fire-box area, the task of the locomotive fireman (especially upon the great trunk lines) is becoming more arduous and trying. So lessening the physical exertion and nervous strain, even in a slight degree, is sure to react in greater efficiency.

THE GOGGLES QUESTION

It appears to the writer that the goggle question as respects the locomotive fireman and engineer has been lost sight of by many operating officials of railroads, inasmuch as the glare from the fire-box or from snow on roads running east and west is a health hazard respecting which many safety men keep hands off. Also, since dust, cinders and other foreign bodies many times cause loss of the sight of an eye, the condition is not so flagrant as to stir some railroad safety officials to action. Furthermore, should the provision of a proper colored glass goggle aid in fuel conservation it concerns the fuel conservation department and one safety agent of one of the largest railroads in the conntry confided to the writer that he couldn't bother himself doing something for another department.

It is maintained by many operating officials of railroads that colored glass

goggles change the color of signals, particularly at night.

With due respect to the source of the above, I have found that smoked glass goggles and other highly perfected goggles bring out more clearly the red, green and yellow lights at night, and large numbers of locomotive firemen and engineers are wearing such with pronounced success, rules prohibiting their use to the contrary notwithstanding. So wherein lies the merit of the excuse that safe operation of trains is endangered by improper observance of signals when proper colored glass goggles are worn?

The rule of some railroads requiring a fireman at all times to be able to verify signals (hand, lantern and semaphore) surely is of no avail. A fireman's attention to the fire-box is anything but infrequent, since it is a fact that on a division of 150 miles a freight fireman many times passes 8 to 10 tons of coal through the fire-box door in as many hours, and in a like distance many passenger firemen dispose of from 5 to 6 tons in about 4 hours over the same route.

Since the firemen on through trains have little time to observe the swiftly passing landscape, the effort of the management toward preserving his vision that he may in due course realize a merited promotion whereby the days of the coal shovel may reflect pleasant memories is one surely worth while.

Toleration of the wearing of colored glass goggles by firemen or engineers, on the part of the management in the face of a rule forbidding such, is no less than the confession of a health hazard without aiding in its abatement.

It is obvious that in the case of en-

Photograph by Underwood & Underwood, N. Y.

WOODEN CARS SPLINTERED INTO MATCHWOOD IN INDIANA RAILROAD WRECK

Photograph shows a part of the wreckage at Porter, Ind., February 27. Within a few hours after the disaster 37 mangled bodies were lifted from the debris. A New York Central train crashed into a Michigan Central train. (Mr. Soderberg's article was written before this disaster, the cause of which is still under investigation.)

gineers who discover impairment of vision the goggle should be a fitted one, and not a "take one" supplied by the gross.

In order to insure full protection the goggles should be worn from the time of filling the lubricator at the commencement of a trip to the arrival at the wash-room upon the completion of the trip.

Without explicit specifications on an order to the purchasing agent to procure goggles for locomotive firemen and engineers, the materials furnished may prove a case of "being sold" and nothing more, for many times such improper goggles are not worn because they are not fitted to the operation. If such a pair of goggles are found almost unused upon the railroad right-of-way, would it be a case of disloyalty—or an evidence of disgust?

The writer's opinion is based upon actual experience as a locomotive fireman, talks and surveys of stocks of many goggle manufacturers, conversations and communications with large and small operating officials, including vice presidents, general managers, road foremen, safety agents and enginemen, and I believe that in many cases the locomotive firemen and engineers are not receiving the intelligent consideration of the eye hazard that their important tasks and responsibilities demand.

Humidity and Air Movement, Important Hygienic Factors

[*E. P. Lyon, Professor of Physiology and Dean of the Medical School of the University of Minnesota, in a paper presented at the annual meeting of the American Society of Heating and Ventilating Engineers in January, remarked, as a matter of opinion, that "some type of humidifier by which air movement would be created, e. g., a combination of electric fan and convenient water surfaces, would be ideal." "Why," he asked, "should not people be willing to pay for humidity and air movement—two important hygienic factors?" Although Professor Lyon's remarks refer, mainly, to the air in auditoriums, motion picture theaters, schools, homes, etc., they apply, of course, with equal force to the crowded workrooms of factories.*]

THE human body is a thermostat. The temperature of the body—that is, the internal parts—is constant . . . .

The body is a machine for transforming energy. One aspect of this transformation is the developing and regulating of heat. The constant temperature of the body is an expression of the fact that the body loses its heat as fast as it produces it, or produces heat as fast as it loses it.

The more important element of body temperature regulation is, however, on the heat loss side . . . .

By three methods, namely, conduction, radiation and evaporation, the body loses all the heat that it makes. All these vary in rate with external and internal conditions. All of them become ineffective under conditions of high temperature and high humidity . . . .

MOVEMENT OF AIR SHOULD BE WORKED FOR

The most usual condition under which the body heat control breaks down is high humidity and high temperature combined. This condition obtains in crowded rooms and auditoriums, because every person gives off both heat and water vapor. Such rooms need primarily new and moderately heated air. Movement of air also helps. Movement under extreme conditions, for example, saturated air of body temperature, would not help heat loss at all; but under usual conditions it does help.

Movement of air in our public places

and homes should be worked for. If we become accustomed to air in motion, we are less affected by outside conditions, where such movement is the rule. We ought to be accustomed to drafts and not affected by them. I shall not be surprised if we come to use electric fans in winter, even more than in summer.

DEFICIENCY OF HUMIDITY INDOORS

The greatest problem from the standpoint of humidity is the home or office, where a few people live and work, in winter in our northern States. We take into our houses sub-zero air which has almost no water content and heat it to 70 deg. Fahr. Even with the water which such air eagerly laps up from furniture, plants, cooking processes, and from the skin and lungs of every occupant, nevertheless the air in our homes is likely to be dryer than that of any desert on earth.

The body thermostat can adjust the temperature of the internal organs to these conditions. There is not such discomfort and danger as comes from overcrowded, unventilated movie theaters or school rooms. But there are somewhat important disadvantages.

DRY AIR AND RESPIRATORY DISTURBANCES

In the first place, in order to keep up the body temperature in dry air, much blood is withdrawn from the skin. Moreover evaporation is active. The skin is cooled, and we "feel" chilly. Hence the tendency is to have hotter rooms, up to 75 to 80 deg., and even 85 deg., Fahr. The skin gets cracked and rough, which is not pleasant, to say the least. The same tendency to rapid drying extends to the mucous surfaces of the nasal passages, the pharynx and trachea, with consequent respiratory disturbances. Nose and throat specialists, generally, attribute the frequency of infections in winter more to the dryness than to the cold. This all amounts to saying that in order to protect its indispensable internal temperature, the body has to abandon more or less the outlying provinces such as the skin and mucous surfaces. They have not enough blood and get dry; they pick up germs and become inflamed.

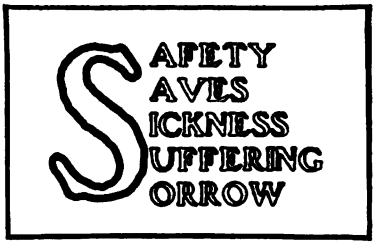
More theoretical, as yet, but perhaps to be found of more fundamental importance is the effect on the nervous system, which in the hot stagnant air of our winter homes is assumed to be deprived of the constant tonic of nerve impulses coming from a skin stimulated by cool, moving air.

ARTIFICIAL HUMIDIFICATION STRONGLY ADVOCATED

I advocate strongly the artificial humidification of dwelling houses in winter in our northern States. The standard should be as high as can be secured without precipitation on inside walls. I do not think we can go above 50% in our houses, as ordinarily built, even with double windows.

On account of leakage the amount of water to be evaporated is large; say 15 or 20 gal. a day for a small house. Therefore, the devices on the market, to be used on radiators, are all absolutely inefficient. Tests show that few of them evaporate as much water as one person gives off from his lungs. Most of the devices used in connection with hot-air furnaces are of little real use.

The problem can be solved, but it requires special attention to certain factors of evaporation, namely, surface of contact of water and air and movement of air. These are more important under house conditions than temperature. A system to be of much use must be automatic, as few people will carry half or two-thirds of a barrel of water daily to hand-filled humidifiers.



Ontario Safety League

A New Tubular Breathing Mask

By George Oliver Smith

Vice President and Chief Engineer, American Atmos Corporation

FOR certain industrial requirements where work must be done in poisonous gases at short distances from fresh air a simple, light and inexpensive protection to the respiratory organs has been desired. Because, however, of the extremely poisonous nature of gases frequently met under these circumstances, perfection in detail of every working part is just as necessary as in the most complicated and elaborate form of self-contained breathing apparatus such as used in mining work. To meet these conditions the Atmos Tubular Breathing Mask has been developed. It consists essentially of the following parts:

1. Rubberized canvas face piece covering eyes, nose and mouth.
2. Atmos perfection respiration valve.
3. Flexible tube from valve to hose line.
4. Leather breast harness and belt.
5. Carrying bag on breast harness for mask when not in use.
6. Specially constructed flexible tubing or hose line. (Both the hose and connections are made strong enough to be used as a life line in emergency.)
7. Funnel with screen at free end of hose.
8. Steel stake with "S" hook attached to be used to anchor the free air end of the hose.
9. Special oxygen injector with gage.
10. One hundred-ft. in 25-ft. lengths with couplings, specially constructed flexible tubing or hose line.

The outstanding and unique feature of the Atmos Tubular Mask is the new special Atmos perfection respiration valve, which has been carefully developed, designed and subjected to the most delicate and difficult tests. It is of two-unit construction, is self-contained, and offers the least possible resistance to inhaled and exhaled air, thereby greatly reducing the physical effort of the lungs. Upon exhalation there is a positive seating of the inlet valve and an entirely free

Atmos Tubular Mask

opening of the outlet valve. This feature enables the wearer thoroughly to "scavenge" (or clear out) the inside of the mask on each exhalation. In other words, there is only a minimum amount of used air which is not completely exhausted from the mask on each exhalation of the lungs, a feature of the utmost importance in assuring the operator of his best working ability. The outlet valve during inhalation makes an entirely tight seal. The valves are carefully protected in the design of the valve box against contamination from dirt or other foreign substance.

The accessory equipments of the Atmos Tubular Mask, such as parts Nos. 7 and 8 listed in the foregoing description, have been added as a result of many conferences with experienced safety men who understand the requirements under actual service conditions of such forms

of breathing apparatus. The design of these parts is also in accord with the best thought of safety engineers who have actually made use of machines of this nature.

All parts of the apparatus are made of the best material to be secured, and the same high quality of workmanship is used in the manufacture of the Atmos Tubular Mask as in all other products manufactured and distributed by the American Atmos Corporation. Special tests are made on each mask during every process of manufacture and assembly, and the completed unit is subjected to an actual gas test before it is shipped.

USES

The mask may be used with assured safety in industrial work where smoke, dust, furnace gases or other noxious fumes exist, where a supply of pure air is available at a distance not to exceed the length of the flexible tubing or hose accompanying the mask. In addition, the mask affords special advantages where it is necessary to work in a confined space, there being nothing but the breast harness on the chest of the user, and this does not interfere in any way with close work. The mask is now in successful use in industrial plants and by public utility companies.

LONG DISTANCE FEATURE

An entirely new and very valuable addition to the Atmos Tubular Mask consists of the Atmos oxygen injector, by the use of which it is possible to extend the range of service of the mask by 100 ft. without increasing the resistance to inhalation in the mask. In other words, when the injector is used, if the operator has 100 ft. of hose connected between the face piece and the injector, he is enabled to inhale without the slightest resistance, and if at 125 ft., the resistance to inhalation when the injector is attached is identical with that when he is only 25 ft. from fresh air without the injector attachment. The injector connected to an oxygen cylinder is attached to the free air end of the hose. Any type of oxygen cylinder as commercially distributed may be used. The oxygen consumption of the injector, being but 2 liters per minute, allows a service period varying from 30 to 50 hours' continuous work from one fully charged commercial oxygen tank as ordinarily purchased from oxygen distributors. Such tanks are to be found at almost every industrial plant, public service corporation plant or well-equipped garage in the country, and it is not necessary to use any special form of oxygen for this work.

A modification of the use of the oxygen injector with the Atmos Tubular Masks is to connect a manifold to the main feed line from the oxygen cylinder, connecting to this manifold three or four masks which may be used by as many workmen and a sufficient volume of air forced to all of the workmen to permit them to accomplish their duties together, even though they may be working in the most poisonous form of gas and at a distance of 100 or 125 ft. from fresh air. They may continue so to work for a period of 8 to 10 hours if necessary without retiring to the fresh air.

The use of the Atmos oxygen injector with the new Atmos Tubular Mask gives promise of opening up a new field of usefulness for gas masks and making classes of work possible which have formerly been accomplished only through the risk of "gassing" the men doing the work or at great expense, owing to the large amount of lost time necessary for the men to return continually to fresh air and be replaced frequently by other workmen for short-period shifts.

No attendant is necessary at the injector, and it is only necessary to watch the gage occasionally to make sure that an ample amount of oxygen still remains in the cylinder to continue the necessary flow of air to the workman.

Safety to Life in Ship Construction

By S. Clarke Brandenstein

Safety Engineer

Proceedings of the American Society of Safety Engineers

THOSE of you who are in any way familiar with ship construction realize the task one has in choosing what may seem to be the greatest hazards of the industry.

There are few housekeepers who agree in detail in regard to the conducting of their individual affairs, but in order to draw comparison and in a sense eliminate conditions that the majority of us meet in the average industry, permit me to make two general divisions of the shipyard, and then take that section where hazardous conditions are more or less foreign to those who do not come in direct contact with any phase of the work that may be considered like unto a general industrial factor of safety engineering.

The two sections referred to are the machine section, where the proportionate comparison with other machine shops is so parallel that one may easily drift into the steel mill or the automobile factory without realizing that he has left the one and entered the other; then we have the hull section, where little or no comparison can be made with any other industry, and it is within the latter part of the shipyard that the most serious accidents occur, therefore I shall confine my subject within the limits of the hull department.

HULL DEPARTMENT

Needless to say, it is again possible to make a subdivision, but rather than consume too much time in dissimilating the plant, I shall choose three conditions that would, in my opinion, contain the most interesting material that is related to the subject presented.

As all of these conditions, according to title, are individual remedies, let us take them in their order and first outline the hazard, which we will then offset by a remedy of engineering revision.

The general titles are: Staging (including all parts such as shell, inside and deck staging), deck openings and falling objects.

LACK OF STANDARDIZATION

Accidents occurring from staging are usually due to one general condition—lack of standardization. It is a well recognized fact that few States have safety standards directly applicable to the shipbuilding plant. The general standards can, if it is the wish of the individual company to conform with State standards, be made to apply so that practically everything is covered.

Instead of a standard working platform of three 3-in. x 10-in. planks, one plank is often used, sometimes forming the only working platform, as high as 60 ft. above the ground. A new man, not used to working in high places, is sent up on such a platform to rivet, chip, caulk, ream, drill or perform some other phase of shell work. Probably a careless bolter had been working on the platform and had left loose materials lying about. The green man, at best not sure of his footing, is an easy victim to the carelessness of another workman, and invariably falls, sometimes with a fatal result, always proving a serious lost-time case. In other instances planks are piled one upon the other, or they are too short, or possibly they contain numerous knots that may be unobserved. Each condition in itself creates a trap for the unsuspecting person, who invariably experiences the worst kind of an accident.

Absence of back rails is another condition that is treated too lightly, possibly appreciated by some as a necessary installation, but in many instances omitted. This omission is a hazard to the pneumatic tool operator,

who, when the tool jams, is often kicked off the platform or unthinkingly steps back, too absorbed with his work to make sure of his footing. This is another important contributor to a bad fall. I have one case in mind: a reamer, who fell 60 ft. because there was no back rail to stop when his machine jammed. He landed on his face, was horribly disfigured and, although seriously injured, eventually recovered, but only after a 7-months' stay in a local hospital.

Accidents thus caused are extremely costly as compensable cases alone; not considering the effect of lost time on production. They are easily overcome.

Permit me to offer as a suggestion a method that has proved its worth many times over, but which required 17 months of persistent effort to have installed.

SHELL STAGING

Shell staging, in its first step of construction, consists of a series of towers, varying in dimensions in accordance with the type of vessel being constructed, but for illustration a tanker, 430 ft. in length with a 60 ft. beam, has 14 towers on each side, each one averaging 56 ft. in height, 16 ft. in width and 15 ft. in depth. A series of nine or more cross logs, or spawls, are placed at varying distances of from 4 ft. to 10 ft. apart, on which working platforms are constructed. The four lower platforms are farther apart, the five upper ones being spaced about 4 ft. apart. This platform consists of three 3-in. x 10-in. planks, 20 ft. long, laid parallel. The distance between the stage towers being about 16 ft., this gives a 4-in. overlap, or a 2-in. overlap for each plank. These are anchored by means of adjustable lagging screws.

Back rails of 4-in. x 6-in. dressed spruce are spaced at 3 ft. 6 in. intervals, vertically, the entire length of the ship, fastened to the uprights of the stage towers by lagging screws.

These are general outlines that have greatly reduced serious and fatal accidents which previously occurred, but which have practically ceased with the adoption of the above as standards.

Inside staging accidents occur from practically the same causes as those outlined under shell staging, likewise deck staging.

INVENTION ADOPTED

To effect a standard the invention of a foreman was adopted. This was a heavy iron clip that fastened on an overhead I beam, having a tapering extension in an inverted position, interspersed with reinforced sections of heavy strap iron, perforated at equal distances to permit the adjustment of platform frames by means of bolt and nut fastenings through the perforations.

In inside work these frames extended along the inside of the compartment, the arrangements permitting the erection of any number of working platforms which are distributed around the four sides of the compartment leaving the bulk of the ship area open. Deck staging could all be arranged by using this invention and constructed in accordance with the requirements of the work to be done. Needless to say, previous conditions of workmen falling from interior working platforms and dropping the full distance or depth of the tank or hatch practically disappeared.

DECK OPENINGS

The next contributor is deck openings. Before the deck sections leave the assembling shop, we often find that deck openings for king masts, ventilator shafts, cargo hatches, oil tanks, etc., are cut in the shop. The sections are then carried out and placed in position upon the hull being constructed, thus creating a serious hazard that is sometimes given little consideration until by experience we are forced to recognize the serious condition confronting us.

Men, whose range of vision is often obstructed while carrying materials, step into the holes and fall great distances; poor housekeeping or a littered deck creates a tripping hazard oftimes in close proximity to an open deck hole; night men, unwilling victims, because of unnecessary shadows,

seemingly walk deliberately into an open hole.

I recall one case of a night man being missed for 3 hours, being finally found in the corner of a coal bunker. He had, according to best deductions, stepped into a coal hatch, which opening was rendered invisible by poor deck lighting and seemed to be a shadow. The extent of the fall was 25 ft., the victim landing on his head, sustaining a basic fracture that proved fatal 5 hours later.

A second case has possibly a humorous side to it. A rigger was placing material and, after warning a fellow-workman to be careful of a deck hole in back of him, stepped into the hole himself and in falling through struck the edge with the back of his head, severing an artery, which nearly proved fatal.

Another contributor to the open deck holes directly related to classification of tripping hazard is air hoses, which have often been suddenly drawn taut and catch workmen between the legs, throwing them violently.

There is no reference in any section of the Industrial Safety Standards in the State of Pennsylvania that could be cited as a standard for remedying this condition, but the expense caused by its neglect would be ample reason for placing a recommendation before the proper officials that could be adopted as a standard. If you will permit my modest reference, immediate adoption of the following recommendation was made in a shipyard with which I have been lately connected, that no holes were to be cut on deck material until the time of installation of the part for which the hole was needed, but if it were necessary for the lapse of a short period of time before such installation, a temporary railing at least 42 in. high was to be installed around the opening. This order was given official sanction and completely eliminated future accidents from deck openings.

FALLING OBJECTS

Time and space will not permit as detailed a discussion of this hazard as it should have. When all of our boys serving in the late world war received as part of their equipment tin hats termed "trench helmets" I was often tempted to experiment with them in the shipyard, but there are moments when heater and passer boys forget their work long enough to permit their imagination to predominate and aspire to be champion twirlers for some big league or expert marksmen on the firing line.

PROTECTION FOR THE HEAD

Whenever the thought of the "trench helmet" experiment arises in my mind, I put it aside because I refuse to be the target of the boys, but I feel that some good might arise if a helmet should be camouflaged under the guise of a regular hat. I believe there are such hats in use today. But it is a hard matter to influence the workmen to make any expenditures, even though it be for self-protection, and unless this safety appliance should be supplied by the plant I have little hope for its success.

Most any time of the day when working in close proximity to a shipway, one is an unwilling recipient of numerous materials ranging from a ⅜-in. bolt to a 10-ft. section of 4-in. angle iron. What need is there of the warning "heads up"? As a better caution we should use the one word "duck." It is hard to say what proportion of accidents result from this hazard, but I feel safe in saying that it is well nigh a major one.

Staging, deck openings and falling objects are only a few of the many suggestions affecting safety to life in ship construction. I have chosen them largely because of the possibility of their being combated through factors of engineering revision.

THE HUMAN ELEMENT

The one great problem still remains, the human element, but the injection of the Golden Rule will prove to any fair-minded man that you are at least trying to do that for him which he does not have enough interest in his own welfare to do for himself.

Safety to Life in Ship Operation

By Commander R. A. Barber

Marine Surveyor for F. H. Price & Co., New York

(Proceedings of American Society of Safety Engineers)

MY sea career commenced in 1892 with an apprenticeship in a four masted bark voyaging from British to Californian and Australian ports. The average passage took 4 months, and the safety appliances, beyond two lifeboats, lifebelts for all and hand-pumps, consisted of good seamanship and the ability to cling on to anything which offered a hold against the ravages of heavy green seas.

After 6 years the sailing vessels were relinquished in favor of cargo steamships, troop transports, large passenger vessels and H. M. ships of war.

FACTORS IN VESSEL'S SAFETY

The safety of a vessel broadly depends on seaworthiness, stability, navigation, seamanship and equipment. It is not intended to say much about construction, this being a problem for the naval architect and shipbuilder. The numerous classification societies insist upon certain dimensions and standards in construction and material before issuing their certificates, without which no insurance of hull or cargo can be obtained.

A vessel can be seaworthy when leaving her moorings, but owing to divers causes, such as collision, fire, stranding or marine perils encountered, may speedily become a source of grave danger to those on board.

Stability of the vessel in a seaway can be determined theoretically by calculation, and practically by means of heeling experiments, the latter method being far too costly and tedious for commercial vessels. Also by means of a scale model in which proportional weights loaded in the various compartments can be adjusted to show the degree of stability needed, before the cargo is actually assembled for loading into the ship. A system such as this is well worth developing and is quite as important as the models and testing tanks, which are in use for arriving at speed, through frictional resistance, whenever a new design of hull model or propulsion is being considered by naval authorities.

Navigation is not an exact science, but in these days the gyroscopic compass and the various instruments for obtaining the deviation of the ordinary compass needle, if properly used, ensure the course as set being steered.

Solar and stellar observations for obtaining geographical position depend upon good chronometers and sextants and the knowledge and accuracy of the observer.

Sounding machines for obtaining the depth of water and nature of the bottom are in general use for confirming the position of the ship by comparison with a chart.

Patent logs record the number of miles run, by means of a fan which is towed from the rail aft and registers the distance on a dial aboard the ship.

The submarine bell warns the navigator of his proximity to shoals and danger by means of duplex microphone receivers.

WIRELESS TELEGRAPHY

By wireless telegraphy the vessel's position can be readily determined by intersecting lines of two or more stations widely spaced on shore; the distance between which forms the base of a triangle and the direction line from the extremities of the base intersect at the apex (where the ship is). It is essential for general safety at sea that the wireless equipment must never be left; in other words, three operators in constant watches should be ever on the alert for sending and receiving messages.

With all the most up-to-date ap-

pliances aboard, the officer in command and his personnel can, by poor seamanship or bad judgment, jeopardize and perhaps lose many valuable lives and much valuable property.

"Safety First" should be his watchword, and all desires to make speedy voyages through fog and ice regions must be side tracked.

The unsinkable ship has not yet shown up, although by means of innumerable honey-combing bulkheads, which are only feasible in ships of war, an almost perfect floating machine can be constructed.

Regarding equipment—systems for the suppression of fires are now available, the modern passenger carrying vessel having numerous hydrants and hose lengths, chemical and steam extinguishers and a constant head of water force for immediate use; together with detectors for apprising the officers of the presence of smoke in any compartment not easy of access to watchmen.

WATER-TIGHT DOOR

The water-tight door in bulkheads has received earnest attention and, though several systems are in use for closing simultaneously all open doors, is liable to remain open through damage to the mechanism in the event of severe collision or stranding of the vessel.

The means of securing hatches are still in a primitive state, and few improvements over the wooden securing wedges, driven into steel hatch cleats, have been put into operation, except in the case of very fast vessels and war ships, in which steel hatch covers are in general use.

The lifebelt has not been materially improved upon for many years, but can, at best, be considered of only secondary importance in ocean-going vessels.

THE PERFECT LIFEBOAT

Lifeboats and their launching appliances still maintain the premier position in life-saving needs and have ever occupied much attention in the deliberations of those chosen to frame regulations for preservation of life at sea.

The perfect lifeboat must be, comparatively speaking, unbreakable, unsinkable, capacious and easy of propulsion. It must be capable of being easily secured for carriage at sea, yet readily cleared away, disengaged and lowered into the water without injury to itself or its occupants. It must be available for lowering when the vessel is disabled and rolling or pitching in a seaway and also when the ship has taken a list. It ought to be fireproof.

It is a very difficult problem to provide berthing accommodation on board on the upper deck of a large passenger ship for sufficient boats for all people carried, hence we find the unsatisfactory substitutes such as liferafts and collapsible boats.

Whereas mechanical hoisting and lowering apparatus has been devised, if the liferaft is carried underneath the lifeboat the problem of winding up the long tackle to lower the raft exists, and if this work has to be performed by night or in heavy weather one can readily imagine the consequence, more especially when the ship is heeled over.

DAVIT DEVICES

There are many excellent davit devices for speedy lowering, and recently an inventor has perfected a very simple device, consisting of a pair of curved skids or runners, kept clamped to the inboard side of the lifeboat, which not only prevents the boat from being stove in but ensures the act of lowering against even a heavy list, by permitting the boat to slide down the shell plating. It can be slipped after the boat has reached the water, and also prevents the boat from heeling over during the act of lowering.

Pyrotechnic lights and explosive sound signals have been brought to a high state of efficiency for distress purposes, and also the rocket and line or gun and line for reaching a beach or cliff by means of an endless line, hawser and breeches buoy, in which people can be landed through surf.

Owing to the commercial necessity

of combining cargo and passenger traffic, it frequently happens that baggage or cargo is being swung from hatches around which third-class passengers are swarming. Many narrow escapes and some accidents occur through some unfortunate intercepting a sling of cargo swinging in the hatch or across a gangway. The use of belt conveyors would not only eliminate these accidents but would enable the saving of time and money in handling package cargo.

ENCASING OF MOVING PARTS

The necessity for the proper encasing of moving parts is emphasized by an incident which happened several years ago when a passenger in an upper berth was scalped through inadvertently sitting up and her loose hair became entangled in the rotating rod of the steering gear which was bracketed to the beams above.

On another occasion a youth dropped a small piece of codline into the steering apparatus of a large and speedy ocean liner, which disabled the rudder, and in throwing steam into the go-astern turbine to avoid collision with another nearby vessel, several rows of blades were stripped and the liner thereby placed out of commission for some 7 months at a terrific loss to the owners.

A steerage passenger, bereft of his reason, was chased overboard by the crew through the lack of wire netting on the boat deck on which he had taken refuge by night to avoid capture.

Through the threat of a foolish mother to put her 8-year-old child out of the porthole as a punishment for naughtiness, an infant (during the mother's absence) was dropped out of the porthole by the 8-year-old.

Portholes are seldom barred and should be large enough to permit of the escape of human beings, but removable bars would mean safty for life and would prevent thefts from outside.

The guards about ladders, gangways and hatches are seldom other than primitive even in the highest class of vessels, the rope lashing being considered sufficient in most cases.

A visit to any cargo steamer in the harbor will prove the lack of safety devices in use at the present time.

Until the underwriters can appreciate the importance of preventing accidents to human beings they will be called upon to pay for their lukewarm interest.

Safety Methods as Applied in the Loading and Unloading of Steamships

By W. E. Welch

Senior Contract Inspector of the Travelers Insurance Company

Proceedings of American Society of Safety Engineers

I WILL give only a brief talk on this subject and confine myself to the methods used in handling miscellaneous freight or cargo in New York harbor, also the handling of coal for bunkering purposes.

We are using the same antiquated methods on antiquated piers that have been in existence for years. It would, perhaps, be surprising to know that the hazards of stevedoring are on a parallel with those of steel frame building erection.

You have all seen, in passing through New York streets, tall steel frame erection.

LOADING OR UNLOADING

Freight is delivered on the piers with trucks or by rail and alongside ships by lighters or barges. The equipment used for loading or unloading consists in general of manilla slings, wire and rope nets, chains, boxes, rail tongs, small locomotives, hand trucks and ship's gear. Ship's gear consists of the cargo booms, winches and the up and down and Burton falls. The falls are single whip, and it will therefore be seen that the hoisting and lowering is done very fast.

The stevedore rigs one cargo boom directly over the center of the hatch, on which is used the up and down fall. Another boom is rigged to hoist or lower from the pier; this is called the Burton fall.

As the Burton fall hoists the draft to the deck level the hook of the up and down fall is attached to draft, and as one winchman eases off the other winchman with up and down fall takes the load gradually across the deck and lowers in hold.

In unloading the method is reversed. The draft is the freight or cargo in the slings, nets, chains or boxes. We at times have considerable trouble with poor gear of the ship, as we can use only persuasive measures with the ship's captain for any correction of poor ship gear. As will be seen, there is considerable equipment used, and it requires intelligent inspection, with the co-operation of the stevedore, to keep this gear in a safe, serviceable condition. I have known of an inspector destroying on one ship 30 manilla slings. Of course, this would have been impossible without the co-operation of the stevedore, so it will be seen that co-operation in inspection work and intelligent and careful supervision will eliminate many preventable accidents.

STEVEDORING ACCIDENTS

In an analysis of stevedoring accidents, which I do daily, we find that the largest percentage of accidents are caused in stowage and discharging, the making up of drafts, cargo falling from drafts, and being struck with drafts. The accidents occur frequently under these items, but the severity, generally, is where ship's gear gives way.

Recently there was a catastrophe in handling of hatch covers by the stevedore. Hatch covers were being placed by the gang of 7 or 8 men, when the strong back failed and all fell to the bottom of the hold. Three men were killed and 3 or 4 badly injured.

COAL BUNKERING HAZARD

In coal bunkering we have another severe hazard, mostly from men being struck with the loaded or unloaded bucket. Canal boats of soft coal are delivered alongside, and the stevedore rigs up a gin pole on the deck level outside the rail. A single whip is used for hoisting, the power being either from a floating hoister or the ship's winch.

A gang of 7 or 8 men load the buckets. When hoisted they are dumped into large wheelbarrows on the deck or on a raised runway and the coal dumped into the bunkers, where it is trimmed by the stevedore. This operation of hoisting and lowering is done very quickly. Buckets hold about ¾ yard, and they are hoisted, dumped and lowered in 5 or 6 seconds.

EQUIPMENT, BEST QUALITY

It will be seen that any failure of coordination among the hooker on, the signal man, the dumpers—one of whom is the signal man—and the hoist runner is bound to cause serious accidents. Also, this equipment all around must be of the best and expertly rigged.

Fire Protection of Schoolhouses

By J. Albert Robinson

Superintendent of the Inspection and Service Department of the Grinnell Company

(Special Correspondence of Safety Engineering)

[*The National Education Association, Division of Superintendence, met recently in Atlantic City. Mr. Robinson represented the Fire Protection Committee of the American Society of Safety Engineers at the Round Table on "Safety to Life in School Planning" under the auspices of the Department of School Administration. His talk was illustrated by the use of 25 lantern slides, especially prepared for the occasion. Safety Engineering presents below a summary of his remarks.*]

THE fire hazards prevailing in the average school buildings of today have not been exaggerated by the eloquent and forceful address we have just heard delivered by T. Alfred Fleming, the able Director of Conservation of the National Board of Fire Underwriters. Criminal seems a mild word when we find school buildings of inferior construction, several stories in height, with only one means of exit and with the basements clogged with storage of waste paper, oils and miscellaneous debris such as he has so vividly depicted.

A great responsibility rests upon you, the school superintendents of America, to improve existing conditions, which should not be tolerated, and to do your utmost to eliminate the conditions which will reproduce the fatalities and potential holocausts which have been described.

One reason why such conditions are tolerated is the general impression that it is difficult and complicated to make them safe.

A great opportunity lies before you gentlemen to give intelligent thought to the subject of safety to life in schoolhouse planning. If the public only realized how simple is the answer its opinion would influence school boards to provide for better construction and for automatic detection and control of fire.

SYMBOLIC ARCH

(Mr. Robinson showed a slide which he described as follows):

"An arch symbolic of the type of school building which should be designed to house our Nation's most precious asset, worthy of our artistic as well as our practical consideration. The arch rests upon the firm foundation of careful planning. One supporting column suggests the need for better construction, even if only to the extent of faithful fire stopping and fire-safe first floors. The other column reminds us of the importance of alarm service and the need for carefully executed fire drills. The columns are mantled with the protecting arch of care and maintenance, the keystone of which is automatic sprinkler protection. Each member is essential in its place, and the unity and safety of all are made possible by this keystone of modern fire prevention. If you consider rejecting this keystone I ask you to recall biblical history and to remember that the stone which the builders rejected became the head of the corner.

"The symbolic arch suggests careful planning. Frank Irving Cooper's Committee on Standardization of Schoolhouse Planning and Construction has brought out several charts which analyze in more detail the essential features of safety to life which should be taken into consideration. One chart makes clear that fire protection is important in order that fire may be stopped before life is endangered; that construction is a factor, since life safety is directly proportional to the speed of burning; and that fire drills, in conjunction with alarm service and proper exits, are essential to rapidly and safely empty the building of all occupants.

VALUE OF GOOD CONSTRUCTION

Another chart analyzes the subject of fire prevention, dividing it into the component parts of location, maintenance and construction. Let us consider for a few moments the left-hand column of our arch—construction. This involves consideration of all building laws, fire prevention rules, approved materials, co-operation with fire protection specialists and strict attention to all structural details.

The value of good construction is universally recognized. We are all familiar with the more common types of construction and building materials in use. The several types of construction which are being developed by the steel industry are not yet so well known. It is of very great interest, in view of the high cost of building, to learn that, at only a slightly increased cost over that of ordinary construction, the most hazardous portions of the school building may be segregated or cut off by the use of a steel lumber fire-safe first floor. In floors of this type light steel lumber joists are supported on roll steel beams, bridged laterally with steel bands, the metal lath supporting the plaster of the ceiling and the concrete fill of the floor above. Various methods are used for supporting steel lumber joist on structural beams. Steel lumber joist may support a wooden floor laid on nailing strips securely fastened to the joist with concrete fill, or concrete slab may constitute the floor.

(Mr. Robinson illustrated this type of construction by showing slides giving details of pressed steel joists, and stated that 11-in. and 12-in. joists of this type are obtainable which can be used for spans as great as 26 ft. under ordinary schoolhouse loading, of 40 to 60 lbs. per square foot.)

MODERN METHOD OF AUTOMATIC FIRE DETECTION

With the time at our disposal it will be possible to discuss only the modern method of automatic fire detection, touching a moment upon the subject of exits and devoting the remainder of the time to the predominating method of fire extinguishment, namely, automatic sprinkler protection.

We will now refer to the right-hand column of our arch. Proper fire drills in schools have been the means of preventing many catastrophes. An approved alarm system, intelligently operated and fully understood, is an essential part of any arrangement of fire drills. Upon the prompt notification of fire depends the efficiency of the fire drills. An automatic means of giving such notification may be had by the use of a thermostat, or sentinel.

(A modern type of sensitive thermostat was illustrated by several views, and they were discussed in detail by Mr. Robinson. He stated that an interesting feature of the sentinel shown was that it gives visual indication when it has operated in the form of a small bulb of solder which appears in the center of the thermostat. He also cautioned his audience that only a system of thermostats wired on a closed circuit system should be considered, in order that any derangement of the circuit may give a local or central station trouble alarm.)

Automatic fire alarms and fire drills may have their value more or less nullified by poorly designed buildings as regards exits. Every schoolroom should have at least two independent means of exit, of ample size to permit the entire school being emptied in 2 or 3 minutes at the most. The horizontal exit is the best arrangement and can easily be provided in new buildings without great additional expense, and in many instances it may be readily built into old buildings.

Had the one bolted door of the pair of doors at the foot of the Collinwood School stairs been open the children might have passed through to safety. All doors provided should be adequate for the number of occupants and, with the possible exception of individual classroom doors and doors on fire walls, should swing with the travel. Doors should never be bolted during school hours except by means of approved panic bolts.

AUTOMATIC SPRINKLERS

Mr. Fleming has covered the protecting mantle of our arch, and he has shown the need for care and maintenance. We will now discuss the keystone to our arch.

There is now a pretty generally understood method of protecting buildings of even wooden construction and rendering life reasonably safe. This is the automatic sprinkler. It is especially suited to buildings already constructed and which could not be made safe in any other way without costly changes. Also, contrary to the notions of some people, automatic sprinklers can be installed in a school without unfavorably affecting the appearance of the rooms.

(Mr. Robinson showed a number of colored diagrams and photographs which illustrated in a way very readily grasped by the layman the manner in which automatic sprinklers operate. One view was of a schoolhouse with a side removed, showing sprinkler heads installed in every nook and cranny in what would otherwise be a veritable fire trap. He described in a simple way the system of piping, and made clear to the school men the difference between wet pipe and dry pipe systems and the operation of automatic sprinkler alarm devices. Perhaps the most impressive views were those showing an actual fire test made in a Cleveland school which was equipped with automatic sprinklers. Kindling for a fire was prepared and a match applied. The first view showed a vigorous fire under way. The second view showed the automatic sprinkler in operation, and it illustrated how the spray from each overlapped and drenched the ceiling above and the floor below. When the fire starts the water starts. When the water starts from an automatic sprinkler the fire goes out.)

A SUMMARY OF ESSENTIALS

Mr. Robinson said in conclusion:

"A sprinkler equipment should not provide the excuse for frail or combustible construction. The principles of our arch should be regarded. Every schoolhouse should, first, be properly built, as nearly fireproof as possible, taking into consideration its size and the funds available for building purposes. An efficient automatic alarm service should be provided. And, finally, a complete automatic sprinkler system should be required by law, at least in all basements, workshops and other hazardous places."

Infected Towels and Bald Heads

THE use, by a bald-headed dentist, of filthy towels to wipe perspiration from his head and neck, made it possible for his widow to collect on an insurance policy which insured him against accidental death. It was his custom to use towels which he used in the practice of his profession for his personal use. They were dirty, had blood and pus on them, which came from the mouths of patients and often had hardened particles of plaster of paris attached to them. A physician had talked to him about his practice of using the towels for wiping his head. He became ill and complained of pain at the top of his head, upon which were circumscribed red spots that were inflamed and swollen. He later went to bed exhausted after having had a chill. The next afternoon he became delirious and died early the following morning. It was the opinion of the attending physician that deceased had been infected by bacterial or septic infection. There was medical testimony to the effect that no day passed on which the dentist could not have been infected by the towels with the streptococcus germ and that the continual rubbing of his head with the dirty towels would be sufficient to carry the germs of infection into his body.

Electrical Safety Conference

EARLY in 1919 the Electrical Safety Conference was organized for the purpose of contributing expert knowledge to the safeguarding of electrical machinery, which, previous to that time, had been subject to regulations drafted by those who, in many cases, were unfamiliar with the hazards inherent in electrical machinery. The results of their efforts were in some cases too rigid, and in other cases extremely lax.

The co-operating organizations in the conference are: Associated Manufacturers of Electrical Supplies, Bureau of Standards, the Electric Power Club, National Workmen's Compensation Service Bureau, Underwriters' Laboratories.

The result of the work of the conference during the past two years is beginning to be apparent. Sub-committees have been appointed on industrial controllers, enclosed switches, rotating machinery, oil circuit breakers and switchboards. Other sub-committees will be appointed as the need for them develops.

The committee on industrial controllers has just completed its work and a comprehensive standard has been issued, compiled in an interesting way. The first section is devoted to the consideration of the scope of the standard and definitions of terms. Apparatus is then classified and consideration given to the classes of people to be protected. The second section is a description of hazards. Section 3 covers methods of protection and Section 4 contains the rules recommended.

Sections 2 and 3 are so general in their application and so worthy of promulgation that SAFETY ENGINEERING reproduces them in full.

SECTION 2—DESCRIPTION OF HAZARDS

20.01 *Touching Live Parts.* (Refer to Section 32.05 for additional description.) Accidents may occur because of contact with a live part of the apparatus. There is a ground of some kind on most power circuits and such a contact will permit current to flow through the person to the ground, which causes a shock and may result in serious injury or death. Touching live parts by the hands or bodies of persons or by metal objects may also cause short-circuits, flashing, etc., which may result in injuries. There is more danger where the voltage of the circuit is high or where there is excessive moisture, acid fumes or other conditions present which might injure the insulation or cause surface leakage; or which might make the floor or platform near the apparatus more conducting.

20.02 *Arc or Flash.* There may be arcing or flashing when making, breaking, or changing the circuit connections even under normal operation. This may be greatly increased by careless or ignorant operation or by abnormal circuit conditions, such as a ground, or short-circuit. The danger arises from arcs, sparks, and molten metal, which may cause burns or eye injury to persons, or ignition of nearby combustible material.

20.03 *Touching Hot Parts.* Certain parts of the control equipment may under working conditions attain a temperature that will burn a person severely, if touched. Such parts are the resistors, and those contacts which become heated by arcing due to the repeated interruption of heavy currents.

20.04 *Explosion of Fuses.* Fuses used to protect apparatus against overloads and short-circuits, especially on large power circuits and with the apparatus near the generating station, occasionally explode with great violence. Such a condition is a possible cause of accident.

20.05 *Gas or Dust Explosion.* Where apparatus is in an atmosphere containing certain quantities of inflammable gas, or inflammable dust or flyings, there is danger that an arc or flash at the controller may ignite this mixture, causing a fire and sometimes an explosion.

20.06 *Moving Parts of a Controller.* Persons near the apparatus may be injured by being struck by the handles or levers of circuit-breakers, and similar parts of the controller which may move suddenly and unexpectedly, unless these parts are properly located and guarded.

20.07 *Phase Reversal.* With certain classes of machinery, such as elevators, cranes and hoists, the motor and load may not move in the expected direction with reference to the operating lever or handle of the controller because of an accidental phase reversal of the supply circuit. This may result in injury to persons because of unexpected direction of motion or con-

fusion of the operator; it may in some cases result in failure of the limit switches and in injury to the machine itself.

20.08 *Unexpected Starting.* Persons may be injured by moving parts of the motor or driven machinery, should the motor be started unexpectedly by another person, or by restoration of voltage after failure of voltage.

20.09 *Over-Speed.* Motors and motor-driven machinery may run at excessive and dangerous speeds because of some change in operating conditions, such as—

(a) Separately excited direct-current motors losing their excitation.
(b) Series motors losing their load.

20.10 *Lack of Emergency Stop at Point of Operation.* The operator of such machines as mixing rolls and calenders may be caught by the machinery and seriously injured if the machine is not immediately stopped by an emergency device.

20.11 *Over-Travel.* Certain machinery, such as elevators and some hoists, unless stopped within certain limits may do serious damage to persons and to the machinery. Since the operator cannot be relied upon to stop the machine at the limits, some device, such as a limit switch, must be arranged to do so automatically.

20.12 *Failure of Power.* Failure of power may cause injury to persons with such machines as cranes or hoists, unless the machine is equipped with a suitable device to stop and hold the load.

20.13 *Current Overload.* Excessive current by overheating some part of the motor, controller or wiring may ignite nearby combustible material or so damage the insulation as to leave the equipment in a dangerous condition.

SECTION 3—METHODS OF PROTECTION

30—GENERAL

30.01 There are two general methods of protection:

(a) By construction.
(b) By installation.

30.02 Some types of industrial control apparatus are so constructed that they provide in themselves the requisite safety features and, therefore, their proper application and use is not dependent upon the conditions of installation and use.

30.03 Such types are available in many forms, but in many cases conditions of size, operation, convenience of repair and inspection, and other considerations make it impracticable to embody in the control appliances themselves the necessary protective features.

30.04 It should therefore be recognized that, in the many cases where complete protection is not provided by the construction of the control apparatus itself, adequate protection must be secured by the proper installation of equipment.

For more complete discussion reference may be made to the National Electrical Safety Code.

31—DESCRIPTION OF PROTECTION BY CONSTRUCTION OF APPARATUS

31.01 *Enclosures.* An enclosure provided as part of the controller to protect against accidental contact with live parts and from arc or flash makes dangerous parts accessible only by opening a door or cover which is secured in the closed position by a lock, by an interlock, or by other suitable means. These enclosures are of the following general classes:

Class I. A solid enclosure without slot or other opening.
Class II. A solid enclosure except for a slot for the operating handle or openings for ventilation, or both.
Class III. Wire mesh, perforated screens or grill work.

31.02 *Operability from the Outside of the Enclosure.* When manual controllers, circuit-breakers, knife switches, etc., have an enclosure such as described in 31.01, the operating handle or lever is arranged so that the apparatus can be operated without opening the enclosing case.

31.03 *Means for Grounding.* A lug or terminal for connecting to a ground wire or provision for connection to metal conduit affords means for grounding frames or enclosures.

31.04 *Protection Against Unintentional Operation.* The unintentional starting of a motor may be guarded against by so locating the operating lever, handle, or button, that it is not liable to be accidentally moved. A starting button may be recessed to provide this safeguard. A latch, which must always be disengaged before the lever, handle, or button, can be manipulated, will also provide the desired safeguard.

31.05 *Locking in the "Off" Position.* A lock, which can be applied to the controller in the "off" position, furnishes a means of protection against the hazards of unexpected starting.

31.06 *Under or Low-Voltage Protection.* Under or low-voltage protection is obtained by such an arrangement of the controller that the circuit to the motor will be interrupted upon the reduction or failure of voltage, and that the circuit will not be automatically restored after the restoration of voltage. This may be accomplished:

(a) By causing the operating lever to return to the "off" position

upon a failure or reduction of voltage.

(b) By making it necessary to return the operating lever of the controller or master switch to the "off" position before the motor can be restarted.

(c) By making it necessary to operate the push-button or an equivalent master switch to restart the motor.

31.07 *Overload Protection.* Overload protection is given by a device, either a part of the controller or separate from it, that will open the circuit or automatically reduce the current when an excessive current flows through the motor and controller. Typical forms are:

(a) A fuse.
(b) An overload circuit-breaker.
(c) A magnetic contactor with overload relay.
(d) The introduction of extra resistance into the circuit instead of opening the circuit.

31.08 *Phase - Reversal Protection.* Phase - reversal protection is usually obtained by a relay which acts to interrupt the circuit upon phase-reversal and thus to stop the motor or prevent it from starting. In some cases this protection may be obtained by arranging the controller so that the motor will always run in the proper direction regardless of phase-reversal.

31.09 *Means for Disconnecting from the Supply Lines.* The disconnecting means may be a part of the controller or separate from it, and is usually—

(a) A switch.
(b) A circuit-breaker.

The fullest protection is provided when the disconnecting means opens all power conductors to the motor and controller.

31.10 *Limit Switch.* At the limit of travel of elevators, hoists, etc., either a small switch in the control circuit causes a magnetic contactor to open; or a switch in the motor circuit opens the circuit directly. The switch is sometimes operated from the winding machine through suitable gearing, and sometimes directly from the moving cage or block.

31.11 *Emergency Stop Device.* A suitable device at or near the motor and driven machinery enables the machine to be stopped quickly in case of an emergency. This may be a switch in either the control circuit or the power circuit, or the manual controller may be so located that it will serve as an emergency stop. A push-button, which projects above surrounding surfaces so as to be operable without using the hand, is a suitable device.

31.12 *Over-Speed Device.* In some applications a centrifugal governor or similar device will act when the motor speed exceeds a given limit:

(a) To interrupt the power circuit and stop the motor.
(b) To slow down the motor by strengthening the field excitation.
(c) To apply a friction brake, or dynamic brake to slow down or stop the motor.

In some applications a relay gives ample protection by acting to strengthen the field excitation and thus limit the speed, or stop the motor, in case the field becomes dangerously weakened.

31.13 *Marking.* A controller may be marked to give the following information:

(1) Duty (starting, intermittent or continuous, etc.).
(2) Rating (line characteristics, HP, etc.).
(3) Service (cranes, hoist, machine tool, printing press, etc.).
(4) Terminal Markings (to correspond with diagram).
(5) "Off," "On," and indication of any other positions as may be desirable.
(6) Important instructions, such as method of manipulating the handle, method of stopping the motor (as a special latch for releasing the under or low-voltage catch, etc.).

31.14 *Design and Arrangement of Parts.* In the design and arrangement of parts of controllers, the safety of operation can be increased.

(a) By arranging the operating handle so that it can be readily grasped without danger of contact with live parts.
(b) By locating and guarding the arc rupturing parts so as to protect persons from an arc or flash.
(c) By arranging and spacing the terminals, contacts and such parts as require inspection so that they are reasonably accessible and providing barriers and making such other arrangements as are necessary to minimize the danger during inspection.

32—DESCRIPTION OF PROTECTION BY INSTALLATION

It should be recognized that no definitely detailed specifications for protection by installation methods can be given which will be universally applicable to all conditions, locations and types of apparatus. In the following a brief outline is given of the protection which may be afforded by the proper installation of industrial controllers as distinguished from those protective features which may be supplied by the construction of the controllers themselves. These are not to be regarded as complete but rather as

indicating in general terms the results to be attained.

32.01 *Guarding.* Permanent enclosures or other suitable, effective guards, partitions, fences or railings, may be so arranged as to prevent persons or objects from inadvertently coming or being brought into contact with live or hot parts or interfering with the operation of the control apparatus and at the same time so as to permit ready access for operation or to qualified persons for making adjustments or repairs.
Handles or levers of circuit-breakers and similar parts which may move suddenly in such a way that persons in the vicinity are liable to be injured by being struck by them may be similarly guarded.

32.02 *Location for Isolation.* Control equipment may be protected by isolation. Such protection is especially available for remote-control and automatic controllers to which access is required only by qualified persons. Where materials handled include metal rods, pipes or other conducting material, isolation by elevation may be supplemented by inclosures or guarding in an effective manner. Rooms and spaces arranged with fences, screens, partitions or walls to prevent access of all but qualified persons may afford protection by installation provided such rooms or spaces are kept locked or under the supervision of a qualified attendant. Isolation may be accomplished:

(a) By installation in a separate room with a locked door or other means for effectively excluding other persons. Such rooms and spaces if properly constructed and ventilated may afford protection against the hazards due to the presence of explosives, inflammable gas, vapors or flyings.

(b) By installation on a balcony, gallery, or platform so elevated and arranged as to exclude other persons. Platforms, steps and guard rails may be required for the use of qualified persons making inspections or repairs.

(c) By elevating more than 8 feet above the floor or working platform. See 31.01 and 32.01 for alternatives.

32.03 *Location Relative to Motor and Machinery Driven by It.*—Where several persons may be working around a machine, and especially when the machine may be started by any one of them, considerable protection will be given them if the place of control is within sight of the machine. This arrangement will also give some protection to the motor and machinery, as the operator is in a position to see whether the machinery is in a condition to be started or not. Such location is not as effective as locking or blocking the controller, master switch, or disconnecting switch in the "off" position.

32.04 *Location for Operation, Inspection and Repairs.*—Consideration in choosing the location should be given to providing:

(a) Sufficient working space about the control equipment so that it is readily accessible to the qualified person for repairs and adjustments. This will encourage proper maintenance.

(b) A secure footing and space for freedom of movement without the danger of interference from moving parts of that or other machinery.

32.05 *Grounding.*—Non-current-carrying conducting parts of the control equipment, such as the frames and enclosing cases of controllers, switches, fuse boxes, etc., which might become alive can be rendered harmless by permanently and effectively grounding. See 31.01 for enclosing means.

32.06 *Disconnecting from Supply Lines.*—Suitable switches are inserted in the supply lines to industrial controllers, except between parts or pieces of apparatus intended to operate as a unit, to permit disconnecting the controllers from the line. Such switches are usually located so as to be readily accessible and they may or may not form an integral part of the controllers.
Any disconnecting means which will render the current carrying parts of the controller dead will serve this purpose.

32.07 *Insulating Qualified Persons from the Ground.*—An insulating floor, mat or platform on which the qualified person must stand when operating the controller or inspecting or adjusting live parts prevents shock from contact with live parts. Insulating gloves, or insulated tools do not give sufficient protection.

32.08 *Warning Signs.*—Exposed control equipment and the natural avenues of approach to such equipment may be marked to indicate the danger of near approach.

The conference is desirous of being the medium for the exchange of ideas relating to electrical safety, especially for codes of cities, States, insurance companies, etc. It will be glad to receive suggestions for topics to be considered by sub-committees in addition to those now at work and to do everything in its power to develop electrical safety along the most desirable lines.

More Truth Than Poetry

I'VE ALWAYS BEEN A CARELESS GINK BUT DO NOT KNOW JUST WHY
DEEP THOUGHT
OF COURSE I NEVER STOPPED TO THINK. I GUESS I DID'NT TRY
STILL DEEPER THOUGHT
I ALWAYS FELT THAT EVERYTHING WAS SAFE AS IT COULD BE, BUT NOW I SEE THERE IS A CHANCE FOR SOME GREAT BIG—
REALIZATION
IDEA
OF AN IDEA
SO NOW WITH HAMMER, NAILS AND PAINT I'LL MAKE A SPECIAL DRIVE TO SPREAD THE PROP-A-GANDA AND KEEP SAFETY FIRST ALIVE.
IT'S APPLICATION
I SHALL BOOST FOR SAFETY FIRST 7 DAYS A WEEK
FOR SAFETY FIRST

Courtesy of F. H. Babcock, Safety Agent, P. & L. E. R. R.

EDITORIAL

THE "LOOKOUT" IN THE CAB

MANY railroad accidents are never satisfactorily explained. Their causes seem to be enveloped in mystery. Official investigations often peter out, reaching no definite or convincing conclusions.

A few weeks ago, a Michigan Central train rushed headong against signals at a grade railroad crossing near Porter, Ind. The momentum of the train carried it over the ties on to New York Central tracks and an express train on that road went into the wreckage at high speed. The Michigan Central enginemen are being held responsible for the disaster—for how is it possible for an engineer to fail to observe and be controlled by signals, as in this case?

The Porter catastrophe, by which scores of persons were killed and injured, gives renewed emphasis to at least four things:

1. Grade crossings must be eliminated.

2. If grade crossings exist, sidings should not be so placed as to make it possible for smoke from another locomotive to obscure signals.

3. The derailing switch at Porter was 500 feet from the crossing, yet the headway of the train carried it over the ties to the crossing. Why should not derailing switches be 1,000 feet distant?

4. Undoubtedly, numerous unexplained railroad wrecks may be attributed to the failure of engineers and firemen to see distinctly, for abnormal reasons.

There is nothing far-fetched in the theory that the engineer (who does not usually wear them) needs goggles at least to protect his eyes against dust and particles which may temporarily obscure his vision. Testifying at official inquiries, he may be loth to admit that his eyesight was out of commission for the time being. A goggle that will at least protect the engineer's eyes from dust and particles flying through the cab would seem to be a common sense requirement.

Moreover, the rules of some railroads for the safe operation of trains require that the fireman shall check up the engineer on signals. Is it common sense to expect that a pair of eyes that are focused most of the time on the incandescent interior of the fire box will be effective when called suddenly to look down the track to verify a signal? Is it not more sensible to believe that more times than not the glare of the fire box will make the fireman's eyes temporarily useless for far vision?

On another page is an interesting article by Mr. Soderberg, Industrial Sanitary Inspector of New York City, who has had much practical experience in railroading. The points he raises respecting the use of goggles by enginemen and his arguments are extremely timely and they have the sound of good horse sense. His article was written before the disaster at Porter, therefore it has no direct application to that wreck. Yet what he has to say regarding the eye hazard in the engine cab is by no means out of order in that connection.

On the effectiveness of the "lookout" from the engine cab depends the safety of hundreds of thousands of passengers who travel every day on steam railroads. The luxury of modern travel is much appreciated by the public, but something is lacking as regards the safety of lives and limbs if a cinder in the eye of an engineer may put his optical apparatus out of commission at any moment. And as for an un-goggled fireman, possessing glare-weary eyes, being able to see colors with 100 per cent efficiency—that seems to be too much to believe or admit.

DON'T "LET UP" ON SAFETY WORK

THERE seems to be a feeling in certain spots that safety and welfare work were of value during the labor

stringency as a strategic method of placating the workmen who were needed in a time of stress, at any price and under any conditions, to keep the wheels going; and that now, under a more favorable labor condition, safe and conservative practices may be abandoned or reduced to small proportions.

In pursuance of such a policy some safety engineers have been allowed to resign and some safety organizations which have taken years to perfect are said to be deteriorating, if not disintegrating.

Does this mean that plant executives deliberately refuse to do their part in preventing death, disease, injury and suffering? Or does it signify that those responsible for the operation of plants have not been convinced of the advantages of the really wonderful records made in accident reduction? The choice of accusation lies between "ignorance" or "homicide" and no employer would like to be accused of either.

Accident prevention is here to stay. The indifferent employer of the past is gone forever and indifference today will lead inevitably to an executive's retirement, either by discharge or by bankruptcy.

It is too bad that those who go forward conscientiously in the cause of wise and humane industrial management should suffer by the neglect of the slackers, but that is exactly what will happen. Labor is fairly contented today with factory surroundings, but wait until it notices that here and there it is losing some of the advantages it has won. Then labor will begin to ask Why.

"Industrial democracy" and "employes' representation" were not wartime fads. They are social reforms that must be recognized. Linked with them is the preaching and practice of safety. And labor may rightly demand that the environment in which it works shall be made as safe, sanitary and comfortable as the nature of the work permits.

REVERE, MASS., GETS A WALLOP

ON Monday, March 14, 1921, early in the afternoon, fire was discovered in a 1½ story frame dwelling house in Endicott avenue, Revere, Mass.

That section of Revere is entirely composed of frame dwellings, practically all with wooden shingle roofs, spaced generally 10 feet or more from lot line (20 feet apart) with good set back and good clear spaces in rear. A typical, built-up suburban district of good class and well spaced.

The fire of March 14 was not a serious one, consuming only two small wooden houses and scorching several others adjacent, a blaze easily controlled by the resources of the average suburban fire-department. The wind was light, very light, and roofs were damp.

Yet so many shingle roofs were set on fire by flying brands and shingles in an area extending 800 feet or more inland that aid from adjacent cities was required and in the opinion of the officers of the Revere fire department, as quoted by the Boston daily newspapers, nothing but the absence of wind prevented a general conflagration.

The conflagration did not eventuate. Not because of foresight on the part of the community, nor of any excess of efficiency on the part of the excellent fire department, but solely because of the intervention of the Providence that is reputed to be the protector of "children, drunkards and fools."

In fact, a sweeping conflagration of the shingle roof type was averted solely by that least dependable of things, weather conditions.

The citizens and local authorities of Revere either lacked forethought or neglected precautions. Now a plain lesson has come to them.

Are they going to continue a large acreage of inflammable shingle roofs, a day and night invitation to the fire fiend to come and devour a section of the city? Panic calls on the fire department of neighboring cities will not save them next time, if the wind is strong.

What the citizens of Revere do, or fail to do, will furnish an answer to the question whether it is possible for a community to be made suddenly and permanently wise by a powerful jolt—a real "sockdolager on the job"—regarding the menace of shingle roofs.

Safety News and Comment

N. F. P. A. Meeting in San Francisco

THE annual meeting of the National Fire Protection Association in San Francisco June 14, 15, 16 will be of great service to the cause of fire prevention in the West and of distinct educational value to all eastern members who may attend. The Railway Fire Protection Association will hold a sectional meeting in San Francisco June 16 or 17. Arrangements are to be made so that N. F. P. A. members who are also members of the R. F. P. A. may conveniently attend their sectional meeting after the conclusion of the N. F. P. A. sessions.

Building Officials' Conference

THE 7th annual meeting of the Building Officials' Conference is to be held at the Hotel Statler, Cleveland, April 27, 28 and 29. Among the addresses are the following:

"Hollow Building Tile and Its Relation to Building Laws and the Administration of Those Laws," by Charles C. Crockatt.

"The Thickness of Brick Walls for Small Residence Buildings," by William Carver.

"Signs and Other Projections in Public Ways" are among the subjects to be discussed.

Safety in Frequent Use of Paint

THE chief of the Portland, Ore., fire department has ordered that all rusty fire escapes in the city be repainted at once; that unless this is done many owners will be required to replace their fire escapes when inspection time rolls around. This is a recognition of the fact that rust weakens metal structures and renders them unsafe; that deterioration results from failure to keep them painted.

It is strange that owners of buildings should be compelled by official edict to preserve their properties from decay. Uncovered pillars, beams, posts, roof supports and other metal structural parts of buildings deteriorate if not kept protected by paint.

Ventilation of Vehicular Tunnel

THE United States Bureau of Mines and the New York and New Jersey State Bridge and Tunnel Commissions have entered into an agreement to conduct co-operative investigations in connection with the ventilation of the projected Hudson River Vehicular Tunnel. The investigations have to do with the best method of supplying the requisite amount of fresh air to remove the poisonous products of combustion from motor vehicles.

Last November, under a similar co-operative agreement, the Bureau of Mines made a report to the commissions relating to the amount and composition of exhaust gases from motor vehicles and the necessary dilution of such gases with fresh air to render it absolutely harmless. The answer to the first problem was obtained by making road tests on 101 automobiles and trucks at the bureau's experiment station at Pittsburgh, Pa. The answer to the second problem was obtained by a series of comprehensive tests on a large number of students in the physiological laboratory at Yale University, conducted by Dr. Yandell Henderson, consulting physiologist of the Bureau of Mines. Dr. Henderson found that no noticeable symptoms of discomfort appeared after one hour's exposure to concentrations of carbon monoxide in air not exceeding four parts in 10,000.

Having found the answers to these two problems, there yet remain the important question of the best method for moving the required quantity of air through the tunnel and finally the

checking up all the results of these various investigations by building a model of the proposed tunnel in which final observations of the efficiency of the proposed system of ventilation can be made. This is the purpose of the investigations now to be conducted by the bureau in co-operation with the Tunnel Commissions.

Ascertaining the best method of supplying the requisite amount of fresh aid depends largely on the determinations of certain factors with references to the flow of air in ducts and bends, such as will be used in the tunnel. The investigation on this problem is to be carried on at the University of Illinois, where an experimental duct 300 feet long, similar to the proposed ducts in the tunnel, is being constructed. The investigation will be directed by Prof. A. C. Willard, head of the Department of Mechanical Engineering, one of the leading authorities on heating and ventilation in this country. The data obtained will be of fundamental importance, not merely to the ventilation of the Hudson River tunnel, but particularly in the metal-mining industry where air is handled at high velocities. The determination of friction of the flow of air in concrete ducts is urgently needed in view of the growing use of concrete construction in modern metal mining.

The final check on the solution of the three previous problems will be obtained in an experimental tunnel that is now being constructed in the Experimental Mine of the Bureau of Mines at Bruceton, Pa., just outside of Pittsburgh. An oval-shaped tunnel having similar construction of ducts to those proposed in the Hudson River tunnel and an axial length of 400 feet is being constructed underground. The cross-section is large enough to run a single line of automobiles through this tunnel with the usual space. Studies will be made with respect to the following features:

a. The diffusion of exhaust gases in the cross-section of the tunnel.

b. Temperature conditions as affected by the operation of internal-combustion motors.

c. Physiological effects of temperature, exhaust gases, and smoke under operating conditions.

d. Final check on all previous investigations.

Pensions for Industrial Employes

"PENSIONS pay," says Elmer B. Tolsted, supervising engineer of the Independence Bureau, Philadelphia. "The benefits to an employer are intangible, and ordinarily inseparable from those attributable to other causes. But the advantages, nevertheless, are there. They will fade, however, and ultimately vanish unless:

"1. The plan is definite and is wisely devised.

"2. Costs are carefully calculated.

"3. The plan is properly funded; and,

"4. It is put across effectively so that it wins the employes' approval and interest.

"If these four fundamentals form the cornerstones of a pension plan it will render signal service to the corporation which has established it."

Miners' Eyes, American and British

THE *News Letter*, published by the National Committee for the Prevention of Blindness, which makes a keen study of everything affecting eyesight adversely, notes that the *American Journal of Public Health*, January, gives a brief outline of Shufflebotham's article stating that miners' nystagmus is the most common occupational disease in Great Britain; that it appears to be at a standstill in the matter of elimination. E. R. Hayhurst calls attention in a note following the synopsis of the article, to the vast differences in countries in the types of occupational diseases most common. He states that in America there is very little evidence of miners' nystagmus and believes the difference is due to the fact that American soft coal mines are not actually gassy to a dangerous extent, hence miners are not obliged to work under the poor illumination afforded by the safety lamps required by law in the British mines.

The same issue contains a brief extract of a report on Eye-strain in Motion Picture Theaters, summing up the results of the investigations of a committee composed of representatives of the British ophthalmologist, the Illuminating Engineering Society and the Physiological Society. Among the points carefully considered are the following:

Proximity and position of seats in relation to the picture, determined by angular measurement; flicker; worn films; instability of projecting apparatus; faulty manipulation; brightness of the pictures, depending upon the quality of the screen and general illumination of the hall.

Progress in Traffic Control

THE use of red, yellow and green as a standardized color signaling in the control of automobile traffic is said to be established in over 200 cities and towns throughout the country. The three colors, recommended by the Standards Committee of the American Association of State Highway Officials, are those uniformly used by the railroads—red, first degree danger; yellow, second degree danger, and green, traffic danger only.

Dr. Willson's Studies Abroad

DR. FREDERICK WILLSON of Reading, Pa., will sail for Europe with his family on April 7, on a vacation trip of several months' duration. While abroad Dr. Willson will visit France, Belgium, Holland, Denmark and Great Britain and will make a special study of industrial eye protection in the countries visited. Already a number of important conferences for the exchange of information and statistics have been arranged with safety societies abroad, and an effort will be made to encourage a closer interchange of safety information and statistics between foreign countries and the United States. Dr. Willson is a member of the American Society of Safety Engineers and until the completion of National Code for Head and Eye Protection was a member of the Advisory Committee on Head and Eye Protection appointed by the United States Bureau of Standards.

Dr. Willson's address in Paris is care of Morgan, Harjes & Company, 14 Place Vendome, and in London, care of Morgan, Grenfell & Company, 22 Old Broad Street, E. C.

Recent Rulings in Pennsylvania

THE installation of electric knife switches not approved by the board (except those mounted on switch and panel boards) is prohibited by the Industrial Board of Pennsylvania. Other recent rulings by the board:

Molding and Mixing Machines in Bakeries—The practice of removing dough from molding and mixing machines, while in operation, is prohibited; and the cleaning of molding and mixing machines while in operation is prohibited.

Prohibiting the Use of the Mouth in Banding Cigars—The practice of bringing the cigar band into contact with the mouth in the course of banding cigars is detrimental to the health of the worker and the practice is hereby prohibited.

Casinghead Gasoline Explosion

AT 7.40 a. m., January 24, a colored employe of the consignee, Colyar, Reese & Co., Memphis, Tenn., climbed to the top of a tank car loaded with casinghead gasoline and proceeded to remove the dome cover, preparatory to taking a sample of the lading and starting the unloading operation. In his ante-mortem statement he is reported to have said that he followed his previous practice in unloading tank cars.

Shipments of casinghead gasoline in tank cars began about 10 years ago and the records of the Bureau of Explosives show the recent disaster at Memphis as the sixteenth example of the results that may follow removal of the dome cover while interior pressure exists in a tank car. This removal is prohibited by the Federal regulations for the safe transportation of dangerous articles, and the

danger has been emphasized repeatedly in the circulars, lectures and other educational propaganda issued by the Bureau of Explosives. Again the employe who violated the rules paid for his ignorance with his life, and again the employer is confronted with the fact that he violated another important requirement when he failed to make the Federal rule effective in his plant by proper instruction of his employe.

Col. B. W. Dunn, chief inspector of the Bureau of Explosives, from whose report the foregoing is abstracted, remarks: "The Memphis accident brings forcibly to our attention, once more, the general hazards of gasoline and the danger involved in having large gasoline plants located so close to the main lines of railroads and to inhabited dwellings. *The country is full of such hazards and it is impossible now to eliminate them.*"

Several explosions followed the escape of vapor and liquid when the cover of the car was unscrewed. According to eye witnesses a column of gas and liquid was forced vertically upward to a height of 100 ft. No fewer than 13 persons lost their lives and 18 were injured. The property loss is estimated at from $150,000 to $200,000. The fires that resulted spread over a wide area, destroying many small dwellings occupied by negroes. This bit of vivid description is taken from Col. Dunn's report:

When the pressure in the tank was partially released by escape of this column of liquid, the remaining liquid in the car continued to boil over the sides of the dome and spread over the ground. Andrew McKinley, who removed the dome cover, had jumped to the ground and with the manager and superintendent of the plant stood momentarily near the office, about 75 feet from the car, looking at the cloud of vapor which the latter stated appeared like a cloud of white steam extending across the street. This cloud was so dense in the air from a height of 5 feet upward that they could not see the buildings on the other side of the street. For the first 5 feet above the ground the air remained clear. The superintendent had heard the escape of pressure while the cover was being removed and looked out of the office just in time to see the cover fly upward and the gasoline gush out. There was a fire in the office stove and he picked up a small bucket of water and threw it on the fire. He then ran across to the garage building for more water, but did not get back to the office with it as by that time a dense cloud of vapor was forming around the office and adjacent space between the plant buildings. The vapor was close to the ground and drifted around the end of the garage building. The superintendent with the manager and employe, who had opened the dome cover, finding themselves surrounded by this vapor, started from a point near the office to run back of the warehouse in a southerly direction. As they turned to run the first explosion occurred in the direction of the block across the street, and about 5 seconds later a second explosion or flash of fire followed, involving the vapor around and between the plant buildings. The clothing of these three men was ignited and one of them, while running, noticed the office building collapse. It is estimated that the first explosion occurred about two minutes after the removal of the dome cover. Fire developed practically instantaneously in the wreckage of the buildings and followed immediately in the oil warehouse and garage building, where it burned fiercely, fed by a large quantity of oils and other inflammable material.

The city fire department responded promptly to an alarm and with little difficulty extinguished the fire in the wreckage of the shattered dwellings, which were already practically destroyed. They were unable to get control of the fire in the warehouse and the plant, and these were entirely consumed.

With the exception of the 3 mentioned employes of the oil company, and the proprietor of a small store on the northeast corner of Front street and Looney avenue, who was injured when the front of his store was blown in by the explosion, the victims were all caught in the area of the block of dwellings between Looney and Saffrans avenues. Aside from several persons claiming to have been knocked down, there were no serious injuries sustained from the force of the explosion, all of the deaths and injuries apparently resulting from burns. Immediately after the first explosion, victims (all negroes) from the block of dwellings were running about with their clothing ablaze. The appearance of some of the bodies, badly charred, indicates that they had probably been out in the air and their clothing had been heavily saturated with the inflammable vapors. Some of them probably died from the effects of inhaling the flames. Strong odors of the vapor were noticed before the explosion, but even with this warning it is not probable that any of the victims appreciated the danger in time to escape.

The first explosion to the east of Front street was evidently due to vapors formed by the column of liquid which was thrown from 50 to 100 feet in the air, and followed the direction of the wind. Vapors from the liquid that boiled over subsequently were carried by eddying currents of the wind into the space in and around the warehouse and storage tanks. It was vapor from this source that caused the second flash. The first explosion was the most severe in its effect upon nearby houses. The wreckage of the wooden buildings was thrown

outward into the streets surrounding the block, and some was thrown westward across Front street and over the top of the oil warehouse.

The oil warehouse contained nearly 50,000 gallons of heavy oils in steel drums and boxed cans. The heat of the fire caused the rupture of many of these packages and the escaping oils added materially to the intensity of the fire. A number of drums and cases of heavy oil and grease stored in the east end of the garage building added to the fire in that building. The seven gasoline storage tanks, containing 70,000 gallons, and located west of the office, were enveloped in flames but did not show any ill effects, although the metal screens were burned out of the vents in three of them. The woodwork about the pump house and elevated storage tanks, about 150 feet from the tank car, was burned and charred.

The records of the Bureau of Explosives contain the following list of fires similar in character to that which occurred at Memphis:

Date, Article, Place	Killed	Injured	Loss
April 22, 1911, Liq. petroleum gas, St. Louis, Mo.	8	7	$2,100
Aug. 20, 1912, Casinghead gasoline, Toledo, O.	2	3	1,000
Mar. 14, 1915, Liq. petroleum gas, Ft. Worth, Tex.	0	1	1,060
Feb. 14, 1916, Gasoline, Cedar Rapids, Ia.	1	0	....
Feb. 6, 1917, Casinghead gasoline, El Paso, Tex.	0	2	3,000
April 19, 1917, Gasoline, Omaha, Neb.	0	0	1,388
May 18, 1917, Casinghead gasoline, Gainesville, Tex.	1	4	36,170
Nov. 13, 1917, Liq. petroleum gas, Bingham, Pa.	0	0	655
Feb. 12, 1918, Casinghead gasoline, Atlanta, Ga.	2	11	5,500
Dec. 31, 1918, Casinghead gasoline, Leach, Ky.	5	1	....
Feb. 13, 1919, Casinghead gasoline, Turner, W. Va.	0	3	17,591
June 1, 1919, Casinghead gasoline, Wilsonburg, W. Va.	0	1	1,000
July 24, 1919, Gasoline, Bayonne, N. J.	0	6	370
July 31, 1919, Casinghead gasoline, W. Tulsa, Okla.	1	1	10,242
Feb. 23, 1920, Casingsead gasoline, Griffin, Ga.	0	4	75,000

Eliminating Waste in Industry

THE work of the Committee on Elimination of Waste in Industry of American Engineering Council is well under way. A definite scheme of operation went into effect on February 7, and on February 21 reports on the first investigation in each industry were made. The chairman of the committee is J. Parke Channing of New York and the vice-chairman in active charge of the inquiry is L. W. Wallace, executive secretary of the council. The work of the committee is being directed from temporary headquarters in the Engineering Societies Building, New York.

The field work, covering principally New York, New England and Pennsylvania, will, Mr. Wallace announces, be completed by April 1. A meeting of the planning board was held on March 1. Preliminary reports were presented and further plans were made for continuing the investigation more intensively. Industries now under investigation and on which reports from field workers have been received are coal, transportation, clothing, shoes, printing, textiles and the metal trades.

The work of the committee includes:

Consideration of the physical condition of the plant as regard lighting, heating, toilet facilities and the like.

Health and safety factors—The American Association of Industrial Physicians and Surgeons is to assist in making the study of the health factor.

Acetylene Disasters in Wisconsin

IN the February number of SAFETY ENGINEERING a note was made of indications of the frequency and violence of private lighting plants (acetylene). The Industrial Commission of Wisconsin, under date of March 11, issued a bulletin saying: "We again urge the necessity of installing such generators in an outside building, properly constructed and well ventilated. While this will not entirely eliminate the danger to life and property, it will at least reduce it to the minimum."

The Industrial Commission gives particulars of serious acetylene gas explosions in Wisconsin in July, 1920, and February, 1921:

ACETYLENE EXPLOSION.—An explosion of acetylene gas on July 19, 1920, in a farm residence at Split Rock, Wis., which caused the death of three members of a family, disfiguring two others for life, led us to issue a warning against the installation of acetylene generators in the basement of a residence.

Another such explosion occurred on February 20, 1921, in a farm residence near Fond du Lac. The following graphic description is given by one on the premises a short time after the explosion, before any cleaning up was done:

"The explosion was heard in the city as well as over the surrounding countryside for miles. Floors in the building were raised over a foot

and holes were torn in the parlor and hallway, while in a sitting room and bedroom the floor was raised in waves. With the exception of two windows, every pane of glass in the building was blown out. Yawning crevices, inches wide, were opened in corners, while the roof in the northwest end of the building was blown up almost a foot. An inspection of the farmhouse this morning (February 21) revealed a scene that was strongly reminiscent of world war scenes in the devastated areas of Belgium. Yawning windows, bulging floors, where big holes appear, a coal stove broken into pieces, plaster laden carpets and rugs, crevices in the angles of the rooms and ceilings all show the force of the explosion. The second floor windows were blown out and the roof was lifted upward. The force of the explosion was so great that the glass from the windows was hurled 50 to 60 feet into the yard about the building. The chimney was twisted and turned, while casings were torn from the windows and doors. That Mr. Schultz escaped with his life is remarkable."

The generator leaked gas when a supposedly automatic shut-off failed to function, and when Mr. Schultz lighted the basement burner the explosion occurred. It is clear that faulty installation, failure of all parts of the generator to properly function, and careless management may cause such leaks at any time and an explosion must result from any light, flame or even a spark.

We again urge the necessity of installing such generators in an outside building, properly constructed and well ventilated. While this will not entirely eliminate the danger to life and property, it will at least reduce it to the minimum.

Doubtless, the Industrial Commissions of other States are keeping track of similar disasters and dangers and are issuing warnings to their citizens.

Locomotive for Gaseous Mines

THE Bureau of Mines has issued the first approval for a storage battery locomotive for use in gaseous mines to the George D. Whitcomb Co., of Rochelle, Illinois. The approval, dated March 14, covers a 6-ton storage battery locomotive, which may be equipped with a battery consisting of either 80-G-14 Edison cells or 48-L-149-29 plate Gould cells. Caustic potash is specified as the electrolyte for use with the Edison battery. As approved the Bureau of Mines recommends this locomotive for service in gaseous mines and considers it much safer than any of the types heretofore used.

Ventilation in Coal and Metal Mines

VENTILATION in coal mining is as important as any other item of operation and provision for circulating adequate air must be made as soon as opening work begins. In metal mining, comparatively little forethought is given to ventilation, and many metal mine operators insist that it is not necessary, or is impracticable for their mines. State laws relative to coal-mining ventilation are generally drastic, but for metal mines laws governing ventilation are generally lacking or are lax and indefinite. However, in actual fact, the need for efficient control of ventilation in metal mines is greater than in coal mines. The latter, it is true, need circulation of good air to remove noxious fumes of explosives and to expel explosive gases, but besides these reasons, metal mines also need ventilation to remove gases and dusts dangerous to health and to reduce high temperatures and high relative humidity which lower the efficiency and ultimately undermine the health of workers. The better health of coal miners as compared with metal miners is probably due to the better ventilation in coal mines.

Valuable information has been obtained by Daniel Harrington of the Bureau of Mines on many recognized problems in mine ventilation, and some new facts brought to light, as follows:

1. The importance of ground temperature in affecting the temperature of ventilating currents, and *vice versa*.

2. The production of heat from the oxidation of timber and of sulphide ores.

3. The surprisingly great increase in temperatures, from frictional resistance, of high-velocity air passing through high-speed fans and in pipes and bends, a matter that the bureau proposes to follow up experimentally.

4. The effect of high temperature on the miner, and his sensitiveness to minute quantities of gases when temperatures are high; also, the economic loss to the mining company from the low productivity of miners working in a high temperature.

5. The generally high humidity in metal mines, and its bad effect.

6. The advantageous effect of cooling the ventilating currents by means of sprays.

7. The importance of ventilating currents of high velocity when temperatures and

humidity are high, in order to keep down the body temperature of miners.

8. The conclusion, supporting previous investigations, that the wet-bulb temperature is the real index of the conditions that cause discomfort to workers when temperatures are high.

9. The economic loss in the widely prevalent practice of using compressed air rather than special ventilating systems to ventilate working places.

10. The importance in planning operations for a large metal mine of laying out workings, when possible, as is done in coal mines.

11. The importance, for protection from the effects of fires and to control fires, of having large capacity reversible centrifugal fans, the main fans being at the top of shafts where a mine fire can not put them out of commission.

12. The development of a canvas pipe system in headings to permit quick ventilation after blasting.

The report is based on extensive observations by Mr. Harrington, in association with engineers and surgeons of the Bureau of Mines and the United States Public Health Service, in and around metal mines in Montana, Colorado, Utah, Nevada and Arizona. Most of the work was in the mines at Butte, where conditions are probably more varied than in any other district, and where much systematic work is being done in ventilation.

Chicago Electric Railways

THE Electric Transportation Committee of the Chicago Safety Council held its first meeting on February 25, G. T. Hellmuth of the Chicago, North Shore & Milwaukee railway presiding.

Charles B. Scott, general manager of the Bureau of Safety and vice president of the Railroads and Public Utilities Division of the Chicago Safety Council, stated that he knew of no industry which has the need for systematic and efficient accident prevention that the electric railway industry has today. He brought out these points:

a. One of the duties of this committee is to get the transportation utilities of this district to fully appreciate the possibilities of organized accident prevention.

b. That it should work out for these interests definite plans for procedure in the safety program contemplated.

c. The major problem of electric transportation companies is not the prevention of employe accidents, but accidents to the public.

J. E. Wilkie of the Chicago surface lines emphasized the fact that when a public service corporation undertakes accident prevention to the public it is apt to be criticised as having an ulterior motive. He said there is great value in the safety council because it represents all interests, including the public.

Harry J. Bell, secretary of the safety council, said that the plan contemplates that activities should be carried on through the homes, schools, churches, industries, public utilities, civic organizations and other agencies, developing a community interest in the prevention of death and injury.

A New Safety Supplies Company

"TISCO" is a new name in the safety supplies field, adopted as a trademark by the Imperial Safety Supplies Company of Cleveland.

The personnel of the new company and the specialization of departments are as follows: Thomas P. Scully, president and general manager, safety organization and equipment; George W. Kosman, vice president, steel and structural; John C. Eiben, second vice president, safety; Earl J. Wilson, electrical engineer, ammonia and hydraulic advisor; M. J. Cutter, guards and safety.

The company is manufacturing machine and safety guards under the trademark "Tisco" and will deal in all dependable industrial safety supplies. The popularity of the gentlemen forming the company and the immediate recognition which they have secured in the way of business connections seems to guarantee the success of the new corporation, which has our best wishes.

Mental Hygiene of Industry

THE Engineering Foundation's study of mental hygiene of industry has been stopped by the death of Dr. E. E. Southard. An offer has been received from the Harvard Medical School to co-operate in re-

suming these studies. Results of Dr. Southard's work have been embodied in the preliminary report written just before his death.

The Foundation has co-operated with the National Research Council in examining the possibilities of bringing about useful co-operation in industrial personnel research. A personnel research federation is proposed and the whole subject will be considered at a conference to be held at an early date.

Miners' Safety Chapters

PLANS for the bringing together of the thousands of miners trained in first-aid and mine-rescue work by the Bureau of Mines into local safety chapters which would form component units of a national parent organization, the Joseph A. Holmes Safety Association, were developed at a meeting of the association just held in Washington, D. C. At the same time this legion of expert savers of life and limb, the only organization of its kind in the world, will serve as a living, stirring, deed-doing memorial to Dr. Joseph A. Holmes, first director of the Bureau of Mines, and popularizer of that pulse-quickening slogan, "Safety First."

Present at the meeting were representatives of the American Institute of Mining and Metallurgical Engineers, the American Mining Congress, the United Mine Workers of America, the American Federation of Labor, the American Society of Mechanical Engineers, the Mine Inspectors' Institute, the American Chemical Society, the National Academy of Sciences, the American Ceramic Society, the Society for the Promotion of Engineering Education, and the United States Bureau of Mines.

It is the hope of the promoters that the various local safety chapters in the mining communities of the country will constitute the means of bringing together the miner and the mine officials as common workers in the great cause of making safer the operation of the 35,000 mines, quarries and smelters in which a million men now do their daily toil in the midst of dangers.

Accidents on N. Y. Traction Systems

A REPORT by the engineers of the Public Service Commission shows an increase of more than 5,000 accidents and delays on Greater New York traction systems in 1920 than 1919. Derailments and defective equipment were responsible for 42 per cent of the trouble.

Personal injuries decreased 37 per cent last year. About 10 per cent of the accident decrease was due to guard wheels on fenders on cars.

Accidents caused by boarding or alighting from cars, which numbered 1,101 in 1919, were reduced to 734 last year. This decrease of 34 per cent was contributed to largely by many new installations of folding steps on car platforms and a decrease in operation of the open summer cars with outside running boards. Car collisions and collisions between cars and vehicles showed a 15 per cent decrease in 1920 as compared with the figures for 1919.

The commission has enforced an order requiring air brakes on all cars maintaining a high rate of speed in congested territory and the reduced number of collisions is attributed to that. The 1920 compilation of accidents and other delays reported shows the following:

	1919	1920
Persons struck	1,431	892
Picked up on WG fender	171	152
Boarding and alighting	1,101	724
Car collisions	644	531
Vehicle collisions	3,367	2,816
Derailments	3,397	3,623
Equipment troubles	10,861	11,215
Other accidents	2,270	2,101
Other delays	7,036	13,196
Total	30,278	35,250

Traffic defects such as delays and derailments should have decreased in 1920, R. H. Nexsen, the commission's chief electrical engineer, reports, but in view of the deterioration of equipment there was a greater increase in these accidents than expected. Mr. Nexsen adds: "Unless the companies soon procure the money to have the necessary upkeep work done there will be an increase in the number of accidents and a further decrease in service."

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

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Regular Meetings—Fourth Friday of each month at 8 P. M.

PROCEEDINGS OF THE FEBRUARY MEETING

THE regular February meeting of the society was held on Friday evening, Feb. 25, President Sanford presiding and calling the meeting to order at 8.30.

The topic was "Safety to Life in Ship Construction and Operation," and papers were read by the following named: S. Clarke Brandenstein, Thomas A. Walsh, F. S. Titsworth and Captain R. A. Barber.

Mr. Brandenstein of the United Gas Improvement Company, formerly of the Sun Shipbuilding Company, directed attention to the necessity of following standard methods in the erection of scaffolds about hulls, as it is in the erection of hulls that most of the shipyard accidents happen. Lantern slides illustrated the subject, and one of the pictures, showing a gangway running longitudinally from a platform hung over the side of the ship to a berthing dock, brought out discussion by Messrs. Dekay, Walsh and Thomas Whalen, the discussion eliciting many interesting features regarding that method of rigging a gangway.

Mr. Walsh confined himself more to the hazards of storing and piling material about the yard; the moving of material by cranes, and the various methods of handling plates and members. A question asked by Mr. Sanford regarding annealing of hoisting chains was answered by Mr. Walsh with a description or account of the method in use at the Merchant Shipbuilding Corporation yard. The method or practice was largely that adhered to by the American Society for Testing Materials as published in its specifications for chains.

Mr. Titsworth dealt in an interesting way with the fire hazard about ship, giving statistics and presenting the necessity of methods being placed in operation for detecting fires at the time and place of starting as well as adequate fire-fighting apparatus for combating a fire after it starts.

Captain Barber of the Cunard Line, formerly of the *Lusitania,* presented in an educational way the modern safeguards to navigation by means of the nearly mechanically perfect instruments in use on the bridge, which make of navigation a science rather than a hit-and-guesswork game as it too often was in the past.

Following Captain Barber, W. E. Welch of the Travelers made a short and instructive talk on the methods of loading and stowing cargoes as practiced in the Port of New York. Mr. Welch, who is in charge of safety affairs in connection with stevedore work in and around New York harbor, has an intimate acquaintance with the subject.

The topic of the evening being of more interest to men engaged in the marine field, the attendance was small, only 28 being present, but the interest of the meeting and the gathering could not be better expressed than in the rising vote of thanks that was given the speakers.

AMERICAN SOCIETY OF SAFETY ENGINEERS RECOGNIZED BY THE NATIONAL EDUCATION ASSOCIATION

A WELL attended meeting of the committee on standardization of schoolhouse planning and construction of the Department of School Administration, National Education Association, was held at the Hotel Traymore, Atlantic City, on March 3. J. Albert Robinson, representing the fire protection committee of the American Society of Safety Engineers, was asked to describe in detail the functions of the society and the proposed work of his committee.

WILL CO-OPERATE WITH A. S. S. E.

As a result of his talk, the committee unanimously passed a resolution soliciting the hearty co-operation and technical assistance of the A. S. S. E. in its deliberations and studies in standardization, especially as regards all features that involved the problem of safety to life.

A keen interest was evinced in the work of the A. S. S. E. and the hope was expressed by Frank Irving Cooper, the able chairman of this large and representative committee, that the society might produce some practical and workable standards which would enable the school architects and administrators to have a definite and reliable guide to assist them in their problems of school design, as regards fire protection and safety to life.

The general discussion which took place showed an especially strong hope that the work of the society might result in suggestive codes which would aid and harmonize the conflicting State and municipal codes and ordinances, thereby offering something tangible and authoritative as a guide for legislative bodies and municipal boards.

The committee voted to accept the assistance and advice of the A. S. S. E. in the immediate preparation of a standard for floor loads in schoolhouse design. It was shown that various legal requirements vary in this respect from a requirement of 40 lbs. to 180 lbs. load per square foot, whereas it is doubtful if a load of 25 lbs. per square foot could ever be packed into a schoolroom. This problem is clearly within the province of safety engineers to solve, for it is obvious that the necessity for unnecessarily heavy floors robs the building funds available for more useful application to safety measures and fire protection.

STEEL INDUSTRY TO LAUNCH CAMPAIGN

The meeting was also addressed by Stanley Macomber, a member of the executive committee of the National Steel Fabricators Association. All persons engaged in safety work are familiar with the interest the steel industry has taken in the conservation of the life of its employes, and the wonderful results attained in accident reduction. Mr. Macomber opened up a new vista of opportunity as exemplified by the willingness of an influential association of commercial interests to appreciate that it has certain public obligations to meet and a service to render in the general safety movement. He stated that the steel industry is about to launch a campaign of public education, with the hope of producing a deeper appreciation of improved construction and the need for safer homes, schools and other places of public assembly. Speaking for his association, he expressed a desire to co-operate to the fullest extent with the A. S. S. E. and hoped that the society would avail itself of their technical experience in any problems of common interest.

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 456 MECHANICAL SAFEGUARDING IS NECESSARY.—It is not easy to determine the extent of results of the application of engineering to accident prevention. Even the data from an individual plant does not show exactly the effect creditable to the engineering work.

If the shop selected does stamping or cold blanking of stock up to, say, ¼ in. in thickness, hand feed only, the installation of fixed guards at point of operation will result in a rapid decrease in the finger and hand injuries. The installation of belt and pulley guards and removal of protruding set screws, and other dangerous moving projections, will further reduce the machine accident probability. Arranging of lighting to cause the rays to be of nearly uniform brilliancy and to meet the line of operator's vision correctly; chairs that are of just the proper height for each operator; location of stock with a view to reducing to a minimum effort in reaching it and taking it to the press; clean presses and clean floors; aisles so arranged that operator's attention is not distracted by passers-by, all tend to reduce accidents, and it is the function of the engineer to bring these improvements about.

The safety equipment of mechanical nature does much to reduce accidents, but the mental effect on the operator, due directly to installation of practical guards and to cleanliness and "school room" orderliness, has an immeasurable and beneficial effect.

Engineering should be first directed to inauguration of the safety committees. The chairman of each committee must be selected for his ability to hold the committee together on a friendly and cooperative basis. Tact is required in stopping unnecessary and irrelevant discussion and to encourage debate, but prevent heated arguments. Knowledge of the business conducted by the firm is necessary to guard against the adoption of impracticable suggestions, and ingenuity needed to suggest ways of accomplishing adopted improvements with less expense than would be necessary in case of adoption of the motion as made. The average workman will make suggestions for accident prevention when permitted to do so. He, in common with the banker or merchant, is pleased or encouraged when he sees his suggestions used. It then becomes necessary that the chairman be quick to see the merits and demerits of suggestions, and he must be capable of pointing out the demerits without leaving a sting. He, too, must assist the worker in outlining a more feasible plan or device in those cases where those, as submitted by the workmen, are not feasible.

Engineering can only be applied to accident prevention by one who is, by nature, a mechanic, and by training both an engineer and a politician. The natural mechanical tendency is required to enable him to devise practical guarding even where others may have failed. The politician is required to favorably interest the employers and managers. When we have first, the full sympathy and co-

operation of the employer; second, an engineer with diplomacy and inventive ability; third, authority vested in the engineer to instruct others; fourth, able chairmen for the safety committees; fifth, a minimum of labor turn-over; then will industrial accidents really diminish.

Mechanical safeguarding is necessary, and perhaps the indifference with which so many look upon it is caused by experience with makeshift installations, impracticable and cumbersome, as well as over-expensive, and the failure of foremen to maintain in good order and repair such equipment as was originally proper for the job.

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No. 457 EDUCATION IN SAFETY WORK.—We hear much about the value of education in safety work. Hardly a week passes but that we read of some new-fangled idea of safety education. All are good, no doubt, and fill a much needed want in the organization from which they come. No doubt, we gather many ideas from the reading of such things. But are we just copying from some one else, or developing a system of education to meet our own needs in safety work? Do we conscientiously follow out these new ideas to the last ditch, or do we become discouraged, all too soon, and discard them for something else?

Along this line, a little experience of my own might be interesting. I had read of some place where a large concern had placed a large sign up at the entrance of the plant, reading something like this:

"This Plant Has Gone —— Days Without a Lost-Time Accident. All, Together, Pull for Safety."

Believing this to be a good idea, I had one made and put up at the front gate of our plant. Everything went well for about 4 months. Once, in that 4 months, the plant had gone 50 days without a lost-time accident, then a stretch of 14 days, and at last it was up to 42 days when a rather serious accident occurred. Quite naturally, the boss called on the safety department for an explanation. After the formalities were over, this is what he said, most emphatically:

"Tear down that d—n sign at the front gate. It's bad luck, for every time it gets up to 40 or 50 days some one gets injured."

"All right," was my answer and down came the sign.

Now, the question is, was that sign bad luck or not? I might mention that bad luck is with us regardless of the sign. The real trouble here is that I didn't stick to the idea of that sign. And that's the trouble with nine-tenths of our so-called educational work in safety. We don't stick long enough to get results. We expect to educate the careless employe (who has been careless for 5, 10 or 15 years) the safe way of doing things in a week or two!

I asked a man to speak to a bunch of workmen one day, at a safety meeting, and he said that he didn't believe he had anything new to say. He only knew that he had said these things once before, and I guess he was afraid that someone would think that was all he knew. I pointed out about 15 new faces in the department and asked the employes if they had ever heard him talk before. One or two ventured to say they had read a couple of articles on safety, but couldn't remember what they were about. Here you are again! Expecting to educate men by telling a few things and not telling any more.

The safety game is somewhat of a missionary game, all right, but it has never come to that degree of perfection yet, where you could tell one man all about the safe way to do things, and expect him to tell another fellow and so on down the line until the whole plant is as safe as Gibraltar. That's what safety inspectors and directors get paid for, otherwise the boss would start his safety campaigns. Don't be afraid to repeat. Every time you tell a message, you tell it better and convince more. Think it over, do *you* ever hesitate to repeat?

For instance, your safety bulletins. Do you ever use them the second time? Why do you, if you do, and why don't you, if you don't? Some safety bulletins always carry a message, and, not

only that, did you ever figure out how many new men come to your plant in two or three months' time? Isn't it a good policy to put up those appealing safety bulletins so that they might see them and learn the lessons taught by them?

At the same time you remind the old-timer, again, of the special hazard illustrated, and again call to his attention the need of carefulness. Not all safety bulletins are good. Some are just a little better than the rest. How do you treat your bulletins? Do you use them once and then lay them away on a shelf or put them in a file never to be touched again? If you do, you do just what the fellow did when he bought a well bound Bible, and laid it on a shelf. He knew it was a good thing to read, but he didn't want it in the way all the time. So he laid it away. Here is what a fellow said to me one day:

"That sure is a good bulletin you have up today. I've seen it before, but it always makes me stop and think."

And there are lots of fellows just like him.

A fellow hates to sing the same old song every day and, quite naturally, someone does something to break the monotony, which is as it should be, or else man would still be living in a cave. But here is the point: We try to assimilate too many ideas, and although we may get by with it, the average employe likes to think it over a while before he gets interested to any great extent. There are some things we should eat every day to keep our bodies in perfect health. There are some things that should be repeated every day, week or month in safety work, in order to keep it going and make it pay the men.

Have you figured out what these things are in your safety organization? You have set out to save human lives through safety work. In order to save human lives you must prevent accidents. In order to prevent accidents, you have built up a system or plan of organization to do this. With the means at your hand, do you honestly feel that you can carry on something new to make the system larger, and still not slight something fundamental in your original system? If you have to slight something, is the new better than the old? Will it accomplish more?

We are not berating new ideas by any means, but it seems to me that we are just as liable to the "isms" and "etc." being attached to the safety movement, that other good movements have had attached to them in the past, and which have been the means of their downfall. Many a good thing has been killed by someone taking the bull by the horns, so to say, and forcing something on it that the movement cannot carry. Practice what you preach. "Stop and Think."

Some of the fundamentals in safety education that should always be kept in mind are:

1. Your bulletin boards.
2. Your instructions to the new man.
3. Foreman's instructions to the new man.
4. The upkeep and installation of your guards.
5. Your safety committee and their meetings.
6. (Most important)—Your disciplinary system for violations of safety rules.

Yes, but you say all the ideas we read about, only go to further develop the six points you have mentioned. Yes, in some cases, and no, in others. For instance, I saw a very nice picture recently of a special bulletin board arranged by some safety department of a large concern. I do not doubt that it was a success there, but for me to use that thing, would have meant the slighting of, possibly, my instructions to the new men or, maybe, hampered me in my safety committee work—or any one of the other five, who knows? I wanted it, but I figured out that our bulletin board at the main gate was getting results, and I wasn't absolutely sure that the new one would do any better.

What is true of this case will be true to any one of the six. If you can safely add a new idea to your safety plan, or subtract (one might from any one of the above six), then by all means add it, but if you have to subtract, think it over well before you do it!

Remember this, safety education is not imparted in a day, week or month,

but it is the result of continued effort, constant assertion, and plenty of the never-give-up spirit. You cannot educate 350 or 1,000 men in a week—to think before they leap—but by constant work along the lines of the six fundamentals of safety education, covering a long period of time, you will have made a good impression on most of them.

In other words, do whatever you are doing *well,* before you tackle something else.

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No. 458 SAFETY FIRST IN THE SCHOOLS.—In the opinion of the writer "Safety First" should be one of the subjects taught in our public schools. While the vital importance of this subject cannot be comprehended, it can be apprehended, and the earlier that one is taught this subject, the more complete will be his apprehension.

There are several reasons why this subject should be brought before our children in the grade schools. It is hard to classify these reasons in any order of importance, as the most important reason to one person would be perhaps of only minor importance to another. All of the following reasons and illustrations have a bearing on this subject.

The psychology of this subject is important and perhaps at least one of the following illustrations will drive home to the reader the fact that a person could most effectively be taught this subject in his childhood days.

When children become old enough to go to school, one can honestly say that they not only start on their educational career, but they automatically start their parents on just such a career.

It is not uncommon to hear a child correct its parents and tell them that certain words or expressions are not correct, or at least state that their teacher has taught them different. In the majority of the cases the child will be correct and soon the parents are obliged to be a little more discreet in the language that they use while in the presence of their children.

Even though the parents are not educated, they seek to use correct grammar before their children, for who is there amongst us that does not aspire to see his children advance to a higher station in life than that to which he has attained?

This perhaps seems a little foreign to our subject, but let us proceed and see if it does not have some bearing on the subject. When the father first takes his boy out to teach him how to split wood, he rarely teaches him to do it in the way he has done it for years. He will have the boy lay the stick on the ground over another stick and, holding it with his foot, proceed to chop it. When the father splits the wood, he holds it in one hand and handles the axe in the other. At the time, the father may not be conscious of the fact, but in reality he is giving the boy a lesson in "Safety First."

Parents teach the child to be more on the alert when crossing the street and in very few cases would allow the child to linger on crossings and be as careless as they themselves are. Is this not "Safety First"?

As the child grows older and learns his multiplication tables, would it not be as easy to teach him that two and two are five? At this time and even earlier he learns the alphabet. Neither of these are ever forgotten, but each year serves to impress them more on his mind and invites him to make a greater use of them. Could not the same be done with "Safety First"?

In later years when the boy becomes old enough to go to work with his father and he is taught any particular line of work, be it in the mines, sawmill, machine shop or office, he is taught to use a greater degree of accuracy and skill than his father would, under ordinary circumstances, use himself. Even the old-timer that has been in the business for 40 years and has never been injured will teach his son to do different than he himself does and will insist that he pay attention to "Safety First." But if the subject were mentioned to him it would only result in his informing you that he has been in the business for 40 years without a single accident.

Anyone who has been around and has seen several accidents will recall that

when the injured is asked why he was doing his work in that particular manner, ofttimes he will say that he was taught to do it in that manner.

After all it is only human nature to extend greater efforts toward the education of your children than toward some one that is not related to you, and when a child has been taught the value of "Safety First" you have not only helped one individual, but all that may come in contact with him in later years of his life.

This, of course, is applicable to all converts and the earlier they are converted the greater will be the number deriving benefits from them. So why not start in the grade school?

Prizes for February Articles

First Prize. No. 455. *A. M. Underhill, Safety Engineer, S. F. Bowser & Co., Inc., Fort Wayne, Indiana.*

Second Prize. No. 454. *A. W. Benz, Safety Engineer, Philadelphia, Pa., Liberty Mutual Insurance Company.*

Honorable Mention. No. 453. *E. W. Cummings, Plant and Safety Engineer, Holt Manufacturing Company, Stockton, Cal.*

Comments by Members of the Committee

No. 454 raises a question little heard in discussion. With his views I am in full accord, but I would add to them. I contend all compensation matters should be handled by the safety engineer. He alone has the fullest knowledge of all details regarding an accident, its cause and the responsibility therefor. The custom so frequently adopted of having a clerk or lawyer handle this matter is poor policy for various reasons. The safety engineer, if his work is properly done, has investigated everything in connection with it and followed the subsequent convalescence and return to work of the injured. This close association between the industrial commissioners and the safety engineers is, in the highest degree, beneficial to both.

No. 453 contains some really useful, practical safety measures. No. 454 is an interesting article, but since it only deals with financial "safety" I have cast my vote in favor of No. 455, which deals in safety as regards the workmen. Simple procedures are outlined in this article which every plant would do well to adopt as the basic principles of safety as applied to their employes. Much has been written in this trend, but it cannot be brought to the attention of the industrial world too often.

It is true that many of us lately entered in safety work do not know what our State's compensation laws have to do with our particular job of accident prevention. The fact is, these laws preceded much of the systematized efforts that industry is putting forth today to check accidents. These same laws, more than anything else, are influencing corporations to join in this wide movement. Figuratively speaking, the shoe fits the feet of a good many of us. Therefore, I vote for No. 454.

No. 455 evidently speaks from experience.

Poems and Songs of Safety

"MOTHER GOOSE" AND OTHER RHYMES FOR "SAFETY FIRSTERS"

P. O. Rispalje, Cudahy Packing Company

Little Boy Blue put his head over the gate
And saw the elevator one second too late.
  Had he used his brains and rung the bell,
  He'd have saved himself a trip to—the
    cemetery.

There was a man who had a bum shoe,
The top was thin and the sole was, too.
  He stepped on a nail and hard luck befell
    him.
  Was he laid up six months? I'll say so.
    You tell 'em.

Little Jack Horner, who works on the corner,
  Got a small piece of rust in his eye.
A blacksmith named Jim took it out for him.
  Now Jack says, "A poor chump was I."

Honk! Honk! Chauffeur.
  He never had a brain.
  He cannot cross before the coming train.
It surely was too bad,
  But it might have been worse,
  For he got a ride in a 90 H.P. hearse.

  There was a young man named Toohy,
  Who used a match in St. Louie
    To find a gas leak,
    And before you could speak
  St. Louie Toohy went blooie.

There was a young man from Ipswichan
Cleaning his pants in the kitchen.
    He used gasoline—
    That's the last that was seen
Of the man or the pants or the kitchen.

There was a careless man,
  And he walked a careless mile.
  He managed to get hurt in his usual careless
    style.
He always had been careless,
  No care for life or limb.
  But there was nothing careless about the way
    they planted him.

There was a young man named Bowers
Who tried to save a few hours.
  He just couldn't wait,
  He climbed through a freight.
What he got was music and flowers.

THE WARNING CRY OF CAUTION

Marian Barney

(Tune: "The Battle Cry of Freedom")

I

We will join the safety movement,
Yes, we'll join it right away,
  Shouting the warning cry of caution.
We will fight all carelessness
And we'll make our city safe,
  Shouting the warning cry of caution:

CHORUS

'Tis safety forever, protection for all!
Down with the dangerous, up with the safe,
While we fight all carelessness
To make our city safe,
Shouting the warning cry of caution.

II

We are answering to the call
Of our city's urgent need,
  Shouting the warning cry of caution.
We will work for public safety
And be always chivalrous,
  Shouting the warning cry of caution.

CHORUS

"SAFETY FIRST"

Ethel Holton

(Tune: "Auld Lang Syne")

In all things you have to do,
'Tis "Safety First" that gets you there.
Of this you all should know.

'Tis "Safety First."
'Tis "Safety First,"
'Tis always "Safety First."
With all your "pep"
Just "Watch your step"
And think of "Safety First."

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

WAREHOUSES, PUBLIC STORES

December 15, 1919. Gibsonburg, Ohio. Paragon Refining Company. Warehouse. One 2-story building destroyed. Walls, wood. Floors, wood. Roof, shingle. Cause, unknown. Fire started on second floor. Discovered by blaze coming through the roof about 2.20 p. m. Alarm, telephone. Duration, about two hours. Stopped when one-half of building was burned. Fire was favored by construction of building. Firemen handicapped by poor water pressure. Private fire apparatus, none. Value of building, $2,000. Property loss, $2.000.

December 30, 1919. Monitor, Wash. Warehouse of Sullivan & Griner and Wenatchee Produce Company, on railroad right of way. Warehouse and fruit shipping. Two 2-story and basement buildings destroyed. Walls, hollow tile, frame and brick. Floors, wood. Roofs, shiplap with roofing paper. Cause, unknown. Fire started in top of building. Discovered by a neighbor, about 8.30 or 9 p. m. No fire department. Duration, over a week. Stopped at west end of buildings. Fire was favored by wooden and paper roofs. No other information.

December 31, 1919. Chicago, Ill. Warehouse of Albert Pick & Co., 35th and Center avenue. Mail order house. Fourth and fifth floors of one 5 and 6-story building damaged. Walls, brick and concrete. Floors, mill. Roof, flat gravelled. Cause, lighted stub left by employes. Fire started on fourth floor. Discovered by passerby, about 3.27 a. m. Alarm, street box. Duration, 7 hours. Stopped at fifth floor. Building was in course of construction, not sprinklered. Fire was favored by contents, cotton mattresses. Firemen handicapped by dark stairways. Private fire apparatus, sprinklers, adjoining south. Persons in building, none. Killed, none. Injured, about 10 firemen. Means of escape, stairways. Value of building and contents, $1,750,000. Property loss, $250,000.

The building was not completed, and not yet sprinklered. On arrival of fire department, it was burning wickedly. Firemen were not aware that it contained merchandise. Being short of space the company had loaded the floors before sprinklers were put in. Loss was confined to 4th and 5th floors, aside from damage caused by water from sprinklers to the building south of the fire. Wall between the two buildings was open in some places on account of construction.

January 5, 1920. Chicago, Ill. 214 West Monroe street. Salesrooms and storage. One 5-story building destroyed. Walls, brick. Roof, wood. Cause, unknown. Fire started on 3rd floor. Seen from street about 9 p. m. Alarm, box. Duration, 4 hours. Confined to building. Fire was favored by ordinary construction. Private fire apparatus, none. Persons in building, none. Killed, none. Injured, 1 fireman. Value of building and contents, $250,000. Property loss, $250,000.

January 15, 1920. Louisville, Ky. Charles B. Conner Company, 17th and Arbegust streets. Manufacturers roofing material. One 1-story building damaged. Walls, corrugated iron. Floor, wood. Roof, tar and gravel. Cause, crossed electric wires. Fire started in center of building in pile of tarred roofing paper. Citizen two blocks away saw fire coming through roof at about 3.16 a. m. Alarm, box and telephone. Duration, about 4 hours (under control in 1 hour). Fire was favored by frame construction and corrugated iron; no fire walls in warerooms. Firemen handicapped by late alarm; building was entirely aflame when alarm was received. Private fire apparatus, none. Means of escape, several large doors. Value of building and contents, $20,000. Property loss, $18,000.

January 16, 1920. Kinston, N. C. Stockhouse at Wheeler-Fields plantation. Two buildings, one 1-story and one 2-story, damaged. Walls, wood. Floors, wood. Roof, wood. Cause, unknown. Fire started in center of building. Discovered by reflection of light on dwelling window at about 8 p. m. Alarm, boy. Duration, about 12 hours. Private fire apparatus, none. Value of building and contents, $15,000. Property loss, $14,000.

January 19, 1920. Jersey City, N. J. John Mullins Furniture Company, 319-21 Barrow street. Furniture storage. One 6-story building partly destroyed. Walls, brick. Roof, slag. Cause, cigarette. Fire started on 5th floor. Discovered by chauffeur employed there at about 9 a. m. Duration, 7 hours. Stopped

at 4th floor. Fire was favored by construction of building. Private fire apparatus, fire extinguishers. Persons in building, about 4. Killed, none. Injured, none. Means of escape, fire escape. Value of building, $50,000; contents, $25,000 Property loss, $24,000.

January 29, 1920. Hartford, Conn. Morris & Company's food products warehouse, 523-525 Asylum street. Wholesale provisions. One 2-story building damaged. Walls, brick. Floors, wood, mill construction. Roof, tin. Cause, probably dropping of a match after lighting oil stove. Fire started in canning room. Discovered by employe at about 7.28 a. m. Duration, 2 hours, 14 minutes. Confined to first floor. Private fire apparatus, none. One person in building. Killed, none. Injured, none. Value of building and contents, $30,000. Property loss, $12,500

January 30, 1920. Salt Lake, Utah. Warehouse No. 2 Bennett Paint & Glass Company, rear 67 West First street, South. Paint, oil, glass, etc. One 3-story building damaged. Walls, brick. Floors, common wood joisted, double floors. Roof, tar and gravel. Cause pot of wax boiling over. Fire started in paint shop. Discovered by employes at about 3.38 p. m. Alarm, telephone. Duration, 1 hour, 50 minutes. Stopped in paint shop, place of origin. Fire was retarded by closed fire doors between paint shop and glass warehouse. Private fire apparatus, hand chemicals. Persons in building, 15. Killed, none. Injured, none. Means of escape, stairs and fire escape. Value of building and contents, $58,853. Property loss, $24,373.

January 31, 1920. Rock Hill, S. C. Warehouse of Arcade Mills. Warehouse. Walls, brick partition walls, frame ends and frame. Floors, part concrete. Roof, mill construction. Cause, unknown. Fire started in partition. Discovered by passing employe at about 6:30 a. m. Alarm, telephone. Duration, about 1 hour. Stopped in same building. Fire was retarded by construction of building. Private fire apparatus, mill department. Property loss, not reported to SAFETY ENGINEERING.

February 7, 1920. Syracuse, N. Y. Warehouse building, 223-229 W. Water street. Storehouse. One 6-story building destroyed. Walls, brick. Floors, wood. Roof, tin. Cause, unknown. Fire started on first floor. Discovered by policeman at about 5.58 a. m. Alarm, box. Duration, about 5 hours. Building destroyed. Fire was favored by wooden floors. Private fire apparatus, none. Persons in building, none. Means of escape, stairways. Value of building and contents, $150,000. Property loss, $135,000.

February 15, 1920. Detroit, Mich. Storage building of Detroit Baking Company, 7-9-11 Labrosse street. One 2-story building damaged. Walls, brick. Cause, grease boiling over on stove (fried-cake bakery). Fire started on second floor. Discovered at about 12:52 p. m. Alarm, telegraph. Duration, 2 hours, 15 minutes. Value of building and contents, $110,000. Property loss, $11,993.

March 4, 1920. Hastings, Mich. Hagar Candy Company plant and H. B. Borley storage house, Colorado and 2nd street. Storage, confectionery, wholesale. One 3-story building damaged. Walls, brick. Floors, wood. Roof, paper and gravel. Cause, furnace. Fire started, about center of building. Discovered by railroad man at about 5:40 a. m. Alarm, telephone. Duration, 4 hours. Stopped in building of origin. Private fire apparatus, none. Persons in building, none. Means of escape, stairway. Property loss, $275,000.

March 7, 1920. St. Louis, Mo. Warehouse of G. Mathes Company, 3107-11 North Broadway. Rag warehouse. One 3-story building damaged. Walls, brick. Floors, wood. Roof, composition. Cause, unknown. Fire started in rear 3107 Broadway. Discovered by employe at about 6:20 p. m. Alarm, street box. Duration, 6 hours. Confined to building. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, 5. Killed, none. Injured, none. Means of escape, fire escape. Value of building and contents, $425,000. Property loss, $67,938.

March 11, 1920. High Point, N. C. Local warehouse of Williamson Veneer Company of Baltimore, West Russell street. Jobbing veneering. One 1-story building destroyed. Walls, iron siding frame. Floors, wood. Roof, composition. Cause, heating tar paint on office stove. Fire started in office. Discovered by boy who was heating tar (no man about) at 7:30 a. m, Alarm, telephone call. Duration, 4 hours. Stopped when building burned. Fire was favored by construction of building. Firemen handicapped by 4 in. mains, could not get enough water. Private fire apparatus, none. Persons in building, 1. Killed, none. Injured, none. Means of escape, doors. Value of building and contents, $15,000. Property loss, $15,000.

March 25, 1920. Montreal, Que. Molson Brewery warehouse, 1028 Notre-Dame, East. One 5-story building damaged. Walls, stone. Floors, wood. Roofs, slate. Cause, unknown. Fire started in the fifth floor. Discovered by employes at about 7:19 p. m. Alarm, street box. Duration, 20 hours. Stopped in same building. Fire was retarded by grain burning with much smoke. Firemen handicapped by accumulation of grain and other goods. Private fire apparatus, none. Persons in building, about 10. Killed, none. Injured, 10 firemen, from smoke. Value of building and contents, $2,100,000. Property loss, $1,250,000.

March 27, 1920. Philadelphia, Pa. Warehouse of General Electric Company, 420-22 North Marshall street. Warehouse for electrical supplies. One 3-story building damaged. Walls, brick. Floors, wood. Roof, tin. Cause, unknown. Fire started on second floor. Discovered by workman at about 12:23 p. m. Alarm, telegraph. Duration, 8 hours. Stopped at 3rd floor. Private fire apparatus, extinguishers. Persons in building, 10. Killed, none. Injured, none. Means of escape, outside fire escapes. Property loss, not reported to SAFETY ENGINEERING.

Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

KLECKLER AUTOMATIC CONE BELT SHIFTER

Once in a long time there appears a safety device so obviously profitable for the manufacturer that it arouses the interest both of the production managers and the financial departments even before it attracts that of the safety engineer. In this class we believe belongs the Kleckler Automatic Cone Belt Shifter.

This device was developed primarily as a time and money saving attachment and marketed as such before the insurance companies began calling attention to the desirability of mechanical belt shifters. The Kleckler Automatic Shifter has never been advertised and until recently has been marketed only by the inventor and manufacturer. Still it has found its way into such plants as those of the Pierce-Arrow Motor Car Company, Buffalo, the Buffalo Meter Company, the Ingersoll-Rand Company of Painted Post, the Corning Glass Works, the American Wood Working Machinery Company and other important shops and tool rooms. The accompanying illustrations will serve to convey the idea of the belt shifter.

It will be noticed that at either end of the mechanism is a weighted pendulum pivoted to the outer edge of the belt actuating levers. These pendulums have gear teeth from the pivot ends which mesh with gear teeth on the inner ends of weighted levers. These are so adjusted as to exert a gradually increasing pressure upon the belt at that pulley on which the move is to be made from a higher to a lower step and can be so adjusted that only the exact ounce of pressure needed for the shifting of the belt is applied.

The pendulums merely accelerate the action of the shifter. This action is aided by the belt guiding loops pivoted on the outer ends of the arms. These rock and guide their sides in parallel with the belt at all angles of movement. The result is a change of pulley speed accomplished with one instantaneous operation so easy and simple that a ten year old boy can shift a 3" belt up and down through a five speed pulley as fast as the eye can follow it. The steadiness and certainty of this pressure on the edge of the belt prevents roughening, stretching and wearing of the belt. It has been found in some cases that belts so stretched and roughened by hand shifting as to be about ready for the scrap heap have in a short time after the installation of the Kleckler Shifter realigned themselves and given additional months of good service.

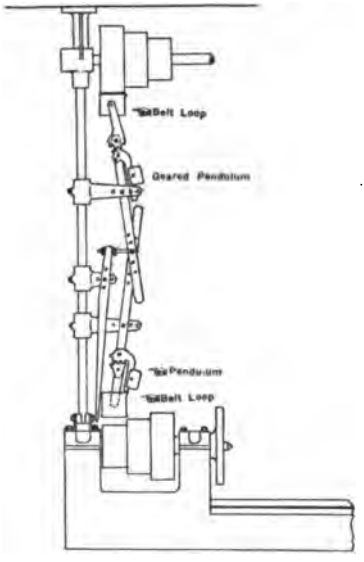


Fig. 1

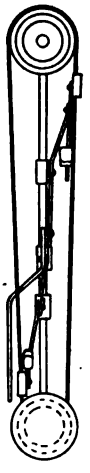


Fig. 2

Fig. 1—Front View of Shifter, Belt Removed for Clearer Vision

Fig. 2—Side View of Belt Shifter

Aside from the profit and advantage through improving the shops' insurance rating and safety, of wear and tear of belts, the Kleckler Automatic Shifter positively augments profits because of the increased production made possible through its use. The production manager in a large Buffalo factory reported to the manufacturers that the output of a particular job, which was already well organized and apparently at maximum production before the introduction of the Kleckler Shifter, was increased twenty-five per cent almost immediately after the adoption of the device.

The installation of the Kleckler shifters is a very simple matter, and adjustable fittings are provided for all standard machines. Its operation is not affected by the length or angle of the belt, which may drive from vertical, diagonal or horizontal.

Mr. Frank Kleckler, the inventor of the automatic shifter, is a machinist and tool maker with thirty years' experience in manufacturing. He was employed in the tool room of the Curtiss Motor Company at Hammondsport when he began the development of his invention, and turned the device over to the company organized after the war to operate the Curtiss Hammondsport plant. The concern is known as Keuka Industries, Inc., and has Glenn H. Curtiss as chairman of the Board of Directors and John H. McNamara as plant manager.

UNIQUE GAS FILTER DEMONSTRATION

A very practical example of the efficiency of the gas masks made by the American-LaFrance Fire Engine Company was shown in their exhibit at the Chemical Convention in New York, and the National Safety Convention in Milwaukee.

The demonstration was accomplished by means of a glass gas chamber, two outlets at the top and an inlet check valve at the bottom. No. 1 opening at the top led direct through a rubber tube to a small face piece. When this face piece was used strong fumes were breathed. It was necessary to attach a small sign to No. 1 face piece reading "Be Careful." No. 2 opening of the gas chamber was connected to the canister bottom of one of their regular gas masks, and as no gas could be breathed through the mask, its advantages in gas laden air could be easily seen by direct comparison with the plain No. 1 face piece having no canister.

Gas masks have already proven extremely valuable and profitable in a wide variety of industries, and although safe protection for more than fifty different kinds of poisonous gases has been furnished, strong ammonia fumes were considered to be the least dangerous for these particular demonstrations in the crowded exhibit halls.

Users of gas masks cannot be cautioned too frequently to use the proper filter for the gas to be encountered, and those who learned in the war to place reliance on their masks should remember that for each gas there is a canister.

This company exhibited a complete line of safety devices, including new designs of respirators, goggles and helmets of all kinds and protective clothing, gloves, etc. An interesting display of German and French Army masks was made with specimens of U. S. Army experimental models, including a mask which they believe to be the first U. S. Army mask made in this country. This mask was made by them for the U. S. Army in April, 1917.

One may always be sure of finding some novelty wherever the American-La France Fire Engine Co. exhibits and their space always possesses a strong human interest.

SAFETY GUARDS FOR PUNCH PRESSES

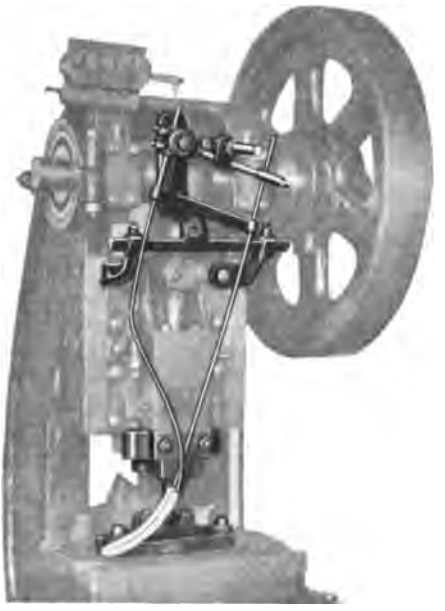
Among the advantages claimed by the manufacturers of the Wiesman Safety Guard are that it does not cut down production, it protects the operator when the press repeats, and it increases production from 10 to 25 per cent over other guards. One of the prominent users of this guard reports not a single "lost finger" in three years of operation with this guard.

It is highly endorsed by insurance inspectors and has been the means of reduction in rates with a number of its users. It makes light press work a safe and attractive job for girls and one user reports that they find girls are faster than men on their light presses, although they would never consider the use of girls before they use this type of guard. Another advantage in the use of the Wiesman Safety Guard is that it makes the employes think that you are giving them the best there is for their protection and relieves the employers completely of that haunting dread of accidents.

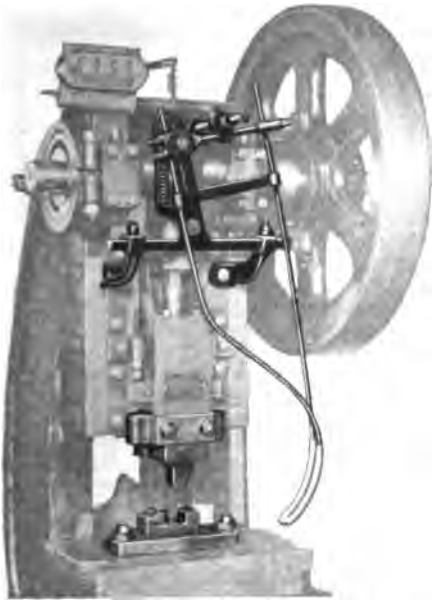
The guard has but two moving parts, consequently there is no wear and tear.

It is positively automatic, not being connected in any way with the lever or treadle. (It is connected to the crankshaft bearing cap.)

The guard interferes in no wise with the operator, who works exactly as usual. The guard never touches him in any way unless his hand is still on the die when the punch comes down. His hand is then brushed swiftly, yet gently, to one side.



Here the press begins its downward stroke—the guard swings well across the danger spot making it automatically impossible for the most careless or awkward operator to get caught as the press descends.



This cut shows the Wiesman Safety Guard at the beginning of the press stroke. Well out of the way—back where it cannot interfere with the placing or removal of the work.

Guard attached in twenty minutes to any press, without boring any holes in the press; is not in the way for any class of work where required, and when not desired, the swinging arm can be removed from press in one minute. Replacement can be made in same length of time. Guard is also quickly reversible for either left or right hand operators.

The same guard can be applied to a large variety of presses and of different sizes. It can be changed from one press to another as required.

There are no gates to be pulled into place by pressure on foot treadle or hand lever. The workman has no occasion to think of the guard except to know that he is safe. The guard never touches the workman except when needed and does not interfere in any way with his line of vision.

The manufacturers, who are the Wiesman Manufacturing Company, 14 North Canal street, Dayton, Ohio, have a very liberal basis on which they furnish opportunities to try out these guards, and those operating punch presses may learn much to their advantage by corresponding with them.

ALL CONTROLLER AND CURRENT CARRYING PARTS ENCLOSED IN NEW P. & H. CRANE CAB

But a glance at the accompanying illustration is required to realize that evolution in traveling crane cage development has reached practically a final stage. During the 37 years of its manufacture of cranes, the Pawling & Harnischfeger Co. of Milwaukee has naturally kept apace with crane requirements, making developments, adding refinements, standardizing—and this new safety cage is the result of this effort. Space is always at a premium in crane cabs and for this reason exposed knife switches, magnetic control parts and resistors introduce a serious hazard. In previous P. & H. crane cages a false bottom in the cab was provided for the resistors greatly simplifying the upper part, but now by providing front lever control also, and placing the entire controller equipment and current carrying parts in an enclosure

Fig. 1

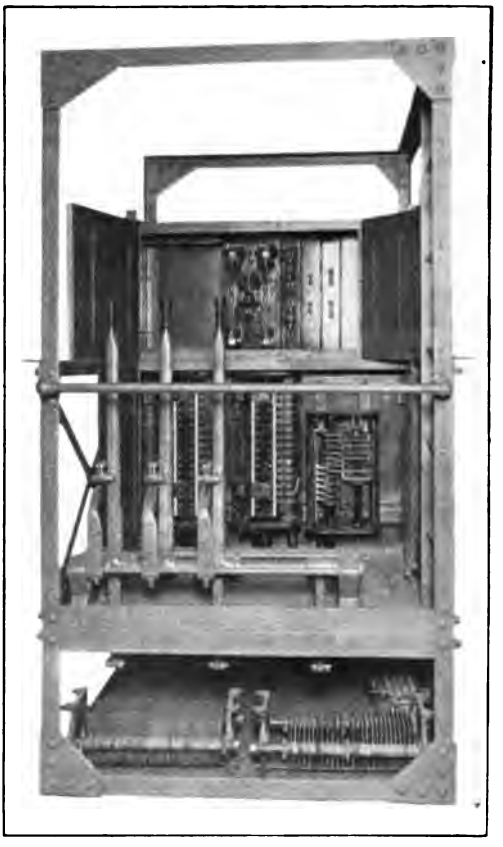


Fig. 2

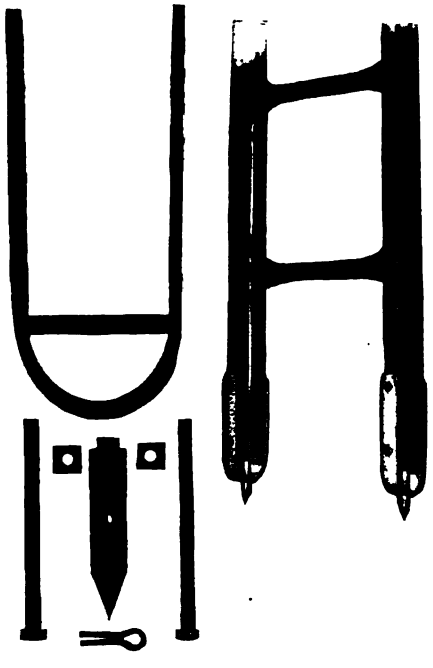
a maximum of safety is provided. The levers which operate radially (backward and forward) are placed at the front of the cage and allow the operator to have an entirely unobstructed view. He can see the position and movement of the crane hook, the signals of floor men, and the entire floor as the crane travels along the runway. Crane operators prefer the radial motion of control levers to the coffee-mill movement previously employed.

The crane operator can by no chance come into contact with live parts, even the main knife switch is operated from the exterior of the cabinet by means of the handle shown near the top of right hand door in illustration Fig. 1. As will be noted in the second illustration, Fig. 2, everything is readily accessible. Opening the hinged doors exposes all parts for inspection and adjustment. The usual covers on the controllers are not needed since the steel cabinet thoroughly encloses the entire equipment. The rear-of-board wiring is accessible by removal of an enclosing panel at the rear. This new cage has been in actual operation on a number of cranes and performance watched for the past year before standardizing.

THE DIAMOND POINT LADDER SHOE

The present day employer is awakening to the importance of preventing ladder accidents, as many serious injuries have resulted where the proper precautions were not taken, and workmen using ladders deserve the best protection possible to secure. Probably no other one device has called forth more attempts at guarding than has the portable ladder base and there is developing an unmistakable demand for a dependable, efficient ladder shoe.

The Diamond Point Ladder Shoe, manufactured by the Safety First Supply Company of Pittsburgh, Pa., is the result of much experimenting and is the final solution to the ladder problem. It is constructed of 1¼" x 3/16" wrought iron, heavily galvanized, and may be easily fitted to any kind of ladder. It is particularly adapted for brick, wood and cement floors and may be utilized for general plant use with absolute safety. It does not have to be jammed down into the floor to secure a hold —the ladder is simply placed in position and takes hold when mounted.



The removable point may be taken out for resharpening, thus making it both economical and time saving. It is made of drill steel, hardened all the way through and tempered to the exact degree. This feature makes the point far superior to the case hardened variety which becomes useless after the points have been ground through the thin shell of case hardening.

The Diamond Point Ladder Shoe will give confidence to your employes who use it. It is not only strong, safe and practical, but it will outlast any other ladder shoe on the market.

USES FOR FERALUN

We have just received detail drawings showing practical suggestions for the use of "Feralun" Elevator Thresholds, the drawings including plan of a typical sill with elevation and section, also a drawing showing the method of connecting the framing.

Feralun threads are adapted to a great many uses other than the staircase application which is so familiar and wherever people walk there is a form of Feralun applicable and for most applications a special descriptive circular is available to those interested. The American Abrasive Metals Company, New York, are the manufacturers.

FRISBIE SAFETY SAW GUARD

Perhaps there is no machine in use which has contributed so much toward the injury and death of workmen as the open and unprotected circular saw of the wood-working factories. Although one of the oldest and most necessary of machines, the rip saw has long been overlooked as an avoidable menace to life and limb, and it is timely that W. M. Frisbie of Ypsilanti, Michigan, comes forward now with a new device which affords insurance to employer and protection of employe.

The rip saw is a veritable demon for inflicting injury, whether in use or not, because frequently it is left running—often many of them at a time in the same shop, their jagged teeth whirring upon the table, ready for the unsuspecting and forgetful workman as he passes, should hand or body accidentally fall upon the saw-table.

When in use, the workman never knows what to expect from the saws as the wood is pressed through, picking up as they so often do, a knot or a sliver from the cross grain and hurling it with great force into the face of the operator.

Mr. Frisbie, whose Safety Saw Guard is shown in the illustration herewith, states that he has seen scores of workmen carried out of the factory to the first aid station after having been knocked to the floor by flying missiles from an unprotected saw—sometimes only stunned, but more often painfully injured. In fact he has so often had narrow escapes from injury himself that his device seemed to come to him as an inspiration and was really invented through necessity.

Simplicity marks the Frisbie Safety Saw Guard in every particular. It consists of an angle plate or hanger, the shank contour of which conforms to the shape of the half of the saw opposite the operator; a hanger plate slide; a shank clamping plate; a main guard member or shield, and finally the sub-shield

which completely envelops the entire guard and saw as well. A spring insures the prompt return of shield to the table after stock has

passed under it, and there is a locking device which makes it possible to lock the shield in any position so it cannot be moved, raised up or taken off. Once installed the old sawyer lets it stay and inexperienced men can operate a saw in safety.

With the saw revolving at the rate of 3,000 revolutions a minute, one could lay prostrate with his body entirely covering the saw guard, on top of it in fact, while the menace just below is entirely robbed of its danger.

With any device designed to eliminate danger, as the Frisbie Safety Saw Guard, practicability must not be overlooked and in this regard the speed of operation of the rip or cutoff saw is actually increased, because the operator is possessed of the feeling of security which the guard at once gives him, and faster work results automatically because of it.

UNDERWRITERS' LABORATORIES

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examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

AUTOMATIC FIRE ALARM SYSTEM FOR CENTRAL STATION SERVICE—Pacific Fire Extinguisher Co., Submitter, 440 Howard St., San Francisco, Cal.

AUTOMATIC LOCAL FIRE ALARM SYSTEM—Atmo Signal Corporation, Mfr., 175 Center St., Nutley, N. J.

AUTOMATIC SWITCHES—MACHINE OPERATED TYPE—Cutler-Hammer Mfg. Co., The, Mfr., Milwaukee, Wis.

BLOWPIPE—Weldit Actylene Co., Submittor, 414 W. Grand River Ave., Detroit, Mich.

CARTRIDGE FUSE CUTOUT BASES—Metropolitan Device Corporation, Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

CHEMICAL EXTINGUISHER, 1½ QT. PUMP TYPE—Booth-Coulter Copper & Brass Co., The, Mfr., 115-21 Sumach St., Toronto, Ont., Canada.

CHEMICAL EXTINGUISHER, 1 QT. PUMF TYPE—Pyrene Mfg. Co., of Canada, Ltd., Mfr., 118 Craig St., West, Montreal, Que., Can.

CLASS A BUILT-UF ROOF COVERINGS—Johns-Manville, Inc., Mfr., Madison Ave. & 41st St., New York, N. Y.

CLASS B PREPARED ROOF COVERINGS—Johns-Manville, Inc., Mfr., Madison Ave. & 41st St., New York, N. Y.

ELEVATOR CONTROL AFPLIANCES—Coote & Lawrence, Submittor, 510 Broome St., New York, N. Y.

ENCLOSED SWITCHES—Garvin & Co., Sam, Mfr., 5124 W. Lake St., Chicago, Ill.

ENCLOSED SWITCHES — Metropolitan Device Corp., Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

ENCLOSED SWITCH—Wadsworth Electric Mfg. Co., Mfr., 405 Madison Ave., Covington, Ky.

FIXTURE FITTINGS—Connolly Electric Co., Mfr., 858 N. State St., Chicago, Ill.

FIXTURE FITTINGS—Electrical Dealers' Supply House, Mfr., 162 West Randolph St., Chicago, Ill.

FLEXIBLE CORD—Habirshaw Electric Cable Co., Mfr., Yonkers, N. Y.

GROUND CLAMPS—Model Products Co., Mfr., 9th & Venango Sts., Philadelphia, Pa.

GROUND CLAMPS—Sprague Electric Works of General Electric Co., Mfr., 527-31 W. 34th St., New York, N. Y.

HOLLOW METAL FIRE WINDOW FRAMES—Jackson Co., W. H., Mfr., 335-61 Carroll St., Brooklyn, N. Y.

INSIDE HAND-OFERATED DISCHARGE DEVICES—Southern Foundry & Mfg. Co., Mfr., Seven Hills, Owensboro, Ky.

INSULATED CABINETS—Van Dorn Iron Works Co., The, Submittor, Cleveland, Ohio.

KNIFE SWITCHES—Connecticut Electric Mfg. Co., The, Mfr., Bridgeport, Conn.

KNIFE SWITCHES—Crouse-Hinds Co., Mfr., Syracuse, N. Y.

KNIFE SWITCHES—Mesa, Fernando C., Mfr., Irvington, N. J.

KNIFE SWITCHES—Metropolitan Device Corp., Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

KNIFE SWITCHES—Oriole Electric Mfg. Co., Mfr., South Norwalk, Conn.

KNIFE SWITCHES—Western Safety Mfg. Co., Inc., Mfr., 247 Minna St., San Francisco, Cal.

LINK FUSES—Bussmann Mfg. Co., Mfr., 3819 N. 23rd St., St. Louis, Mo.

LINK FUSES—Metropolitan Device Corp., Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

MEDIUM BASE RECEPTACLES—Benjamin Electric Mfg. Co., Mfr., 120-28 S. Sangamon St., Chicago, Ill.

MEDIUM BASE RECEPTACLES—Mesa, Fernando C., Mfr., Irvington, N. J.

MEDIUM BASE RECEPTACLES—Pass & Seymour, Inc., Mfr., Solvay, N. Y.

MEDIUM BASE SOCKETS—Pass & Seymour, Inc., Solvay, N. Y.

MEDIUM BASE SOCKETS—Feerless Light Co., The, Mfr., 663 W. Washington Blvd., Chicago, Ill.

OUTLET PLATES—Sprague Electric Works of General Electric Co., Mfr., 527 W. 34th St., New York, N. Y.

OUTLET PLATES—Standard Electrical Mfg. Co., Mfr., 504 Prospect Ave., S. E., Cleveland, Ohio.

PANELBOARDS—Cregier Electrical Mfg. Co., Mfr., 220 W. Ontario St., Chicago, Ill.

Safety Engineering

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Chicago Elevator Explosion

THE pictures show the appearance of the "largest grain elevator in the world," Chicago, operated by the Armours, after the grain dust explosion on March 19. The shock was felt over an area of five miles and was heard as far as Benton Harbor, Mich., across the lake. Six persons were killed and a dozen or more injured. The property loss ran into the millions. The wrecked elevator was supposed to represent the safest type of elevator construction.

Investigations to determine the cause of the explosion were begun promptly by four bodies, the Illinois fire marshal's office, the United States Grain Corporation, the Chicago fire attorney's office and the authorities of Cook county.

The Bureau of Chemistry, United States Department of Agriculture, as a result of recent investigations, declared:

1. That dust explosions and fires in grain elevators are largely preventable.

2. That workmen in

(*Continued on page* 190)

Photos by Underwood & Underwood, N. Y.

Safety Features of Steam Boiler Accessories

By Warren Hilleary

Superintendent, Schedule Rating Depart ment, Royal Indemnity Company

Proceedings of joint meeting of Philadelphia Section, American Society of Mechanical Engineers and Philadelphia Safety Council

BEING without knowledge of the difference between accessories, apparatus, appliances and fitting, as applied to steam boilers, I have selected a few of those devices which I consider accessories and have treated each in the order of seeming importance:

SAFETY VALVES

These should be at least two in number on every steam boiler, for the reason that if only one valve is provided it may fail. It is evident that if there are two or more safety valves there will be less likelihood of excess pressure being raised on the boiler than if only one is used. We are assuming that the combined capacity of the valves is proper and in accordance with modern standards.

The question of mounting the valves on a "Y" or other base, the single outlet of which connects with the boiler, has been frequently debated upon, and apparently there is no objection to the "Y" base.

It is difficult to mention safety features of the valve itself which have not already been taken care of by manufacturers of approved valves. When the valves are constructed of approved materials, equipped with the correct spring for the pressure to be carried and have the desired angle of disc and seat, there is little further to be said, except that there must be an easily accessible means of lifting the disc from the seat for testing purposes. "Easily accessible means" to be interpreted as indicating that the attendant must be able to lift the disc from the seat while the boiler is under pressure, without danger of burns on hot parts, without having to grope about for a cord or lever, without climbing a ladder, and preferably from a point where the pressure gauge and the water gauge glass can be viewed while the disc is being held off its seat, for in operating practice it too frequently occurs that the boilers are being worked beyond normal rated capacity, and if the water chances to be quite high in the boiler the lifting of the disc when the gauge pressure is up to within a pound or two of the blowing point may cause water to be carried into the steam line. If both the pressure gauge and the water gauge glass are visible from the point where the disc may be raised the action of the water in the glass will very often indicate to the attendant whether the disc should be instantly dropped or whether it is safe to hold it open for a few seconds. Theoretically, the lifting of the disc under any conditions will not cause water to be carried into the steam line, but in practice this frequently occurs. Where the boiler load is intermittent, which is also a frequent occurrence, it is often necessary to carry the water very high in the boiler during periods of the lesser steam demands, in order that when the greater steam demands are suddenly made it will not be necssary to rapidly pump feed water into the vessel, thus making it more difficult to maintain the necessary steam pressure.

The discharge outlets of the safety valves should, of course, be so arranged that there will be no likelihood of any persons being scalded, nor having dust blown into their faces and eyes when the safety valves open, but it is not desirable that the outlet should be piped farther than absolutely necessary. The character of the piping should be as straight as possible and with no more than one bend, or elbow, in the line. The bend, or elbow, to be provided with at least a 1-in. free drain at the lowest point, except that if the discharge outlet is less than 1 in. the drain need not be so large. There are cases on record of where persons have been scalded by safety valve discharge, and also where se-

vere eye injuries have resulted from dust on the boiler tops being blown into the eyes of attendants. In some plants a ½-in. pop valve is installed on each boiler and set 2 or 3 lbs. lighter than the main safety valves. The blowing of this pilot valve, which makes considerable noise, is a warning to the attendants that the main valves are about to blow, and I am not sure that it is not a good idea to place these pilot safety valves on every boiler, for the expense is not considerable and there is, no doubt, an advantage in knowing that the main valves are about to blow.

WATER GAUGE GLASS

It is generally conceded that the gauge glass should be provided with a guard to prevent flying particles of broken glass from striking the attendants, but it is not easy to obtain guards which will leave a free and unobstructed view of the water level where the water column is located 10 or 15 ft. above the boiler room floor. This is not an uncommon height on several types of boiler. Gauge glass guards of a suitable and efficient nature are limited to a very few, and unless the purchaser chances to select one of these few the result is dissatisfaction and the discarding of the guard. Since the breaking of the gauge glass is a common, expected and unavoidable occurrence, and since many severe injuries have been received from flying particles of glass, it is evident that operators should make every effort to secure a proper guard and be willing to experiment to some extent in the endeavor to get one which is efficient and at the same time does not obstruct the view of the water level.

The newer forms of connections for the gauge glass permit considerable misalignment of the glass and more expansion than the types heretofore used, so that glasses will be breaking less frequently, but no device, other than a guard around the glass itself, may be expected to eliminate the very considerable danger incident to a breaking glass. Until very recently the tightening of the gauge glass gasket, or washer, was done by revolving a hexagonal nut. The action of revolving this nut put a considerable twisting strain on the glass. The latest device is in the form of the ordinary packing gland and follower and puts no twisting strain on the glass. In addition to this valuable feature, it permits great misalignment of the glass. The only safe gauge glass valve is the quick opening, chain operated type, which permits the operator to stand some distance from the glass and control the line of steam and water to it by merely pulling on one of two chains to either open or close the valves as the case may require. With the screw type of gauge glass valve it is necessary for the operator in opening and closing the valves to expose himself to the likelihood of a glass breaking, and the exposure is for a considerable length of time, since it takes considerable time either to open or close the two valves.

GAUGE COCKS

The non-thread weighted, or self-closing, gauge cocks have many advantages over the screw type, and can be used to more advantage in a greater number of places than the screw type, the latter being improper for any condition except locomotive work where the vibration and jar is so great that the screw type is better. The only reason that the self-closing type has not met with more favor is because attendants will not give them the attention to which they are entitled, with the result that they leak. With reasonable care—and it is expected that all mechanical equipment should have this—the self-closing gauge cock will outlast any other, is far safer than the screw type and the attendants using them are in no danger of being scalded through causes attributable to the type of valve; whereas with the screw type scalding is not uncommon. There are cases of where the valve was screwed entirely out, thus allowing a stream of hot water to discharge from the valve opening, with no way to stop it except to relieve the boiler of all pressure.

WATER COLUMNS

The water columns of many of the older installations are frequently of insufficient capacity, and while, theoretically, water seeks its own level, it is a fact that the gauge glass frequently shows

a false water level where the column capacity is too small, and the installation of a modern type of column and its equipment is a good investment for any boiler user who may at present be using the older types of small columns, scarcely larger in internal diameter than the pipes to which they connect. Obviously, since the purpose of the column is to show a still water level in the boiler, it follows that it should be of sufficient capacity to insure the least possible agitation. The difference of opinion as to whether the column connection should be equipped with stop valves is considerable, but there is scarcely greater excuse for stop valves on the water column connections than there is for stop valves between the safety valve and boiler, and water column stop valves will eventually be closed at a time when they should be open; at least we are led to that conclusion when we remember that it is always the unloaded gun which kills. It is admitted that there are advantages in having stop valves on the water column connections, especially in territories where the boiler feed water is quite bad, for water with considerable solid in it causes accumulations of this solid, whatever it may be, in and on the parts of the gauge cocks, with the result that they leak more or less, and with the stop valves in the water column connections, the column may be shut off and the valves repaired without blowing down the boiler. I think, though, that the disadvantages of having the stop valves outweigh the advantages.

ADVANTAGES AND DISADVANTAGES OF HIGH AND LOW WATER ALARMS

These alarms have their advantages, but they also have their disadvantages. In my opinion they should not be used, for the simple reason that attendants invariably come to rely solely on the automatic action of the alarm, with the result that frequently the water level runs dangerously low, through failure of the alarm, and it would seem that the attendant should not have duties sufficiently multitudinous to prevent him from properly watching the water level through the gauge glass and the testing of the gauge cocks.

PRESSURE GAUGE

These instruments, as a rule, do not cause accidents, and yet, if they are not equipped with a syphon in the form of a loop, or "U" bend, the tube will shortly harden and cause the gauge hand to show improper reading.

BLOW OFF

A common danger which has without any good reason existed for many years exists in the use of a 2½-in. diameter blow off pipe on certain types of water tube boiler. The type referred to has a drum capacity of about 44 cu. ft., and under average conditions the drum would be half filled with water during normal operation, that is, there would be, roughly, 20 to 25 cu. ft. of water in the drum. With 160 lbs gauge pressure, which is the normal pressure for the type, it is possible to blow all the water out of the drum in between 8 and 10 seconds, which means that, even with quick opening and closing blow off valves, the attendant would have great difficulty in properly blowing the boiler down without blowing out so much water as to leave the drum and certain of the tubes empty and exposed to the hot furnace gases. It is strange that the manufacturer, the user and the multitude of inspectors do not realize this danger and reduce the diameter of the blow off pipe to 1½ in., which would be ample for the particular type referred to. A boiler with less than 75 cu. ft. of water between the point registered by the center of the gauge glass and the highest point of contact with the furnace gases, and carrying a pressure of 160 lbs., should have a blow off pipe no greater than 2 in. in diameter, for with any large diameter the proper blowing down of the boiler will lower the water level below the highest point of the gases and thus create a dangerous condition. Our boiler codes give us the minimum and maximum diameter of the blow off pipe, without taking into account the cubical capacity of the boiler. The size of the blow off equipment on fire tube boilers is seldom found to be too great for the water capacity of the boiler. On water tube boilers it is frequently found to be too great. At-

tendants soon learn that they cannot with safety open the blow off valve wide when blowing down, so they adopt the practice of opening it only part way, the result being that proper blowing down is not accomplished and sediment lodges in the valve, causing various inconveniences, expensive repairs and danger.

It seems desirable that the boiler code should take into account the proper area of blow off pipe with relation to the pressure carried, and the cubical contents of the boiler between normal water level and the lowest safe water level.

NON-RETURN VALVES

Among many dangerous practices continually going on at least two stand out. While they are not related to each other, they seem to exist pretty well together in power station work. The one is the synchronizing of two alternators by guess, that is, by watching the effect of the current alternations on an incandescent lamp. The other is the cutting in of a boiler on a header which is being supplied by other boilers. The guesswork on synchronizing not infrequently throws the whole system out of step, and the guessing of the proper time to open the stop valve from boiler to header sometimes results in disastrous explosions. In the first case a very simple and inexpensive synchronizing indicator is purchasable and absolutely reliable. In the second instance a much cheaper and simpler device, in the form of a non-return valve, is procurable which will not only prevent the boiler from being cut into the line too soon, but will also protect the entire system in the event of a tube bursting in one boiler. Non-return valves are a necessity, but education of the user into the necessities of having non-return valves is an inordinately slow process. If it is not beyond the jurisdiction of the boiler code to deal with non-return valves, then certainly the code should state that non-return valves should be used on every boiler connecting to a header with one or more other boilers.

ROTARY TUBE CLEANERS

Rotary tube cleaners, motor or turbine driven, are the only mechanical means for cleaning the interiors of tubes of water tube boilers. With curved tubes the cleaner, in its efforts to follow a straight line through the curved tube, more or less rapidly wears away the metal of the tube at certain points near the bends, and not infrequently the tubes are so thinned by the cleaner that they burst during operation. There is no object in running the cleaner through the tubes until there is some scale present. The greater the amount of scale the slower the cleaner will travel through the tube, and, since the rotary speed of the cleaner is constant, it follows that if it stands still, or practically still, at any one point in the tube, and its cutting parts continue to revolve, a spot in the tube will be worn by the cutters. The extent of this wearing cannot be determined by any process of inspection; therefore, a danger is present the character of which makes it highly advisable that the boiler washer be most carefully instructed in the proper use of the cleaner, having the dangers of improper use explained to him, and further advisable that tubes which are apparently still good should be cut out at certain intervals, depending upon the frequency of use of the cleaner, and replaced with new ones; the old one being examined at the curves by sawing through to determine the remaining thickness. Steam turbine cleaners have an added danger of the steam hose bursting, and this hose, in addition to being wire wound, should be discarded and replaced with a new one at least twice each year, regardless of the amount of actual use, for both the rubber and the fabric used in the manufacture of the hose deteriorate with age, and bursting steam hose has caused a great number of very serious accidents.

CONCRETE FLOORS UNDER BOILERS

If concrete floors are not accessories they nevertheless deserve comment when they form the bottom of the ash pit and combustion chamber of any type of boiler in countries where the atmospheric temperature reaches or falls below the freezing point. A substantial concrete floor laid on clay or most any soil other than dry sand becomes dangerous when heated through to a temperature of more

than 212 deg. F., for the moisture which collects under the floor is converted into steam by the heat, and there is probability of the floor being burst with great violence, due to the pressure under it. There are records of accidents resulting from what amounted to an explosion of the floor, caused by steam pressure forming under it, and, quite naturally, before a substantial floor can be burst by steam pressure, acting upward under it, the pressure must be quite high; it just as naturally follows that this high pressure when instantaneously released must be expected to do considerable damage in the immediate vicinity, so the specifying engineer of boiler installations should take into account the dangers connected with the use of concrete floors under boilers, when such floors are laid on soil which will not permit any steam formed under the floor to travel downward before the pressure generated reaches anything substantially above atmospheric.

FURNACE DOOR LOCKS

There have been a number of accidents to boiler attendants in the nature of scalds and hot fuel burns, resulting when bursting tubes or flues push open the fire or ash pit doors and allow steam and live coals to pass into the boiler room at a point where the attendant may be expected to be stationed. A great many, if not all, of these accidents could have been prevented by the installation of automatic door locks, types of which are now on the market, and which, when the doors are even somewhat carelessly closed by the attendants, still lock, so that no amount of pressure inside the furnace or ash pit will throw the doors open. The objection to installation of the locks is frequently that if the lock is so substantial that it will not break and allow the door to open, then the pressure which would, without the door lock, open the door and be relieved, must then blow out the boiler walls. The proper attitude, however, is to consider that the safety of the attendant is the first consideration; if it is necessary to sacrifice a part of a boiler wall to save the attendant's life, then the wall should be sacrificed, but it does not follow that the boiler walls will be blown out by a tube explosion in the event of the furnace and ash pit doors being locked, though, admittedly, if a 4-in. tube in a water tube boiler carrying 160 lbs. pressure bursts along 1 or 2 ft. of its length, there will momentarily be a considerable pressure in the fire and gas passages; this pressure may, if the doors are locked, blow down a portion of the boiler walls or lift off the top cover. There are perhaps no more than one or two inexpensive yet reliable door locks manufactured, and the reluctance of operators to install locks is caused to some extent by the failure of some of the makeshifts which have been installed, but all of those having opportunity to do so should prevail upon operators to install approved furnace and ash pit door locks.

STEAM FLOW METER

This valuable device has not met with the welcome reception to which it is entitled, and there is probably no good reason why every boiler operating in a battery with one or more other boilers should not be equipped with a steam flow meter which will be a positive indication to the fireman that each boiler is or is not delivering through its steam line its proper proportion of steam.

In any battery of boilers, even when each boiler has precisely the same theoretical capacity of its fellows, there will be one or more either delivering less steam or more steam than it should deliver, and this inefficient and rather dangerous condition is instantly detected by the reading of the steam flow meter. The increasing or decreasing of the fire intensity can immediately be accomplished to exactly the degree required for the boiler to do its proportion of steaming. Perhaps the safety features of a steam flow meter are greatly outweighed by their efficiency features. Nevertheless, there is less danger present in the operation of a battery of boilers when each boiler is doing its proper portion of the work than when one or more boilers are doing much more or much less than its share of the work; the danger lying in the probabilities of burning the tubes or sheets of the boilers which are overfired, and the danger of low water in the

same boilers and excess water in the under-fired boilers. These statements do not take into account the ideal condition of boiler operation, which is seldom realized, but instead contemplate average working conditions where some scale is present and where all boilers are fed through a common source.

OIL BURNERS

All steam or air atomized oil burners either are in themselves dangerous or the equipment necessarily used in connection with them becomes dangerous through their use. Mechanical atomization is reasonably safe; since mechanical atomization is more economical, by a considerable margin, than steam or air atomization, it may be expected that sooner or later all atomization will be done by mechanical process, to the complete exclusion of the steam or air process. The most economical steam atomizer oil burner will require from 2 to 4% of the total steam generated in the boiler for atomization of the fuel oil, whereas mechanical atomizers use none of the power generated by the boiler, exclusive of that required to pump the oil to a given pressure and furnish heat for it, and this power is also required with the steam atomizer. With steam atomization carbonization takes place at the burner tip, resulting in an unequal spread of the fire, and this, in addition to reducing efficiency, produces a danger, in that it frequently causes the fire to concentrate upon one or more relatively small areas on the tubes or sheets, causing burns and bags which are admittedly sources of danger. This condition does not exist with mechanical atomization. The steam or air atomizer will be set to properly atomize the oil at a given boiler pressure which, let us say, is 10 lbs. lower than the desired boiler pressure. The attendant regulates the burner to increase the boiler pressure by 10 lbs. The multitudinous duties of the average attendant call him to some refractory boiler fed pump or elsewhere, and while he is busy for 5 minutes the steam on the boiler increases the desired 10 lbs., with the result that the atomizer valve will pass more steam to the burner than is desirable and literally blow the fire out. After a few seconds a quart or more of crude oil has entered the furnace, and, since there is no flame present, the hot bricks generate explosive gas from the oil. This gas explodes and blows out the boiler walls. Such a condition is altogether unlikely with mechanical atomization. The one possible objection to mechanical atomization is the necessity of bringing the oil to a high temperature before it enters the burner. The temperature being necessary to reduce the oil from a heavy to a light condition, and it seems to be the practice to heat the oil to 250 or 275 deg. F., yet I have learned of no accidents attributable to bringing the oil to a Fahrenheit temperature of 275 deg. Careful damper regulation is paramountly necessary when oil fuel is used. If the attendant is burning coal and forgets to open the damper before firing up after a short or long shutdown, there may not be an explosion of confined coal gas, but with oil fuel it is extremely dangerous to start the fire or admit any oil to the furnace until after the damper may have been opened at least a few seconds, for fuel oil is converted into gas very quickly by relatively low temperatures, and the explosive power of this gas is considerable, so, unless the damper is opened wide before oil is admitted to the furnace, an explosion of violence is apt to occur and not merely blow down a portion of the boiler walls but injure the attendants.

EXPLOSIONS OF GASES IN FIRE BOXES

Burns from hot gases passing through the furnace doors into the boiler room are rather too common. These burns are not always caused by explosion of furnace gas, but the person burned and those who may make a perfunctory examination into the case are apt to state that there was an explosion of gas in the furnace.

If a boiler is manually fired and has a thick, long flame, the fire burning with a strong draught, and if for any reason the damper is suddenly closed, hot gases and the flames themselves frequently pass through the furnace doors into the fire room, and any persons in line with the fire door and no more than 3 or 4 ft. away from it are apt to be burned,

whether they are actually attending to the fire or whether the door was closed.

The sudden closing of the damper is something which does not frequently take place accidentally, although there are one or two types of damper regulator which under certain conditions of bad repair permit a rather rapid closing of the damper. None of these regulators if in good repair will close the damper rapidly enough to cause flame and hot gases to pass into the boiler room.

Many of the burns from hot gases which pass into the fire room through causes other than the furnace explosions have been traced to the sudden closing of a manually operated damper, weighted in a manner to hold the damper closed, and it is good practice, therefore, to weight a damper in such manner and so heavily that the damper will open itself. When this is done danger of the damper accidentally being closed is very slight, and any one of the many simple contrivances can be arranged to hold the damper in the closed or any intermediate position against the tendency of the weight to open it.

If a shovel full of very wet coal and as much as a quart of free water is thrown upon a red or black fire a considerable explosion is apt to result from the water gas, which is instantly formed and ignited, so evidently it is bad practice to stand in front of the furnace door and throw in wet coal and unabsorbed water.

If the damper is partly closed, as is frequently the case in normal operation, to prevent too rapid combustion, any exploding gas in the fire box will be more dangerous to the attendant in front of the fire doors than the same amount of gas would be with the damper wide open.

Where steam blowers are used for forced draught there is generally considerable piping between the original source of steam and the blower valve. If the blower is not in constant use condensation takes place in the supply pipe and considerable water accumulates. The opening of the blower valve permits the water in the pipe to be suddenly projected into the ash pit, where the temperature under many normal conditions may be well over 225 or 250 deg. Fahr., and, while I am not prepared to say why the explosion should take place in the ash pit, it nevertheless is a fact that this has occurred, burning an attendant severely; and, while it may seem that to install a steam trap immediately above the blower valve is an over-precautionary measure, there is at least one case of record which would seem to justify such an installation.

I do not personally know of any instance where the attendant was burned when he opened the furnace door at a time when forced draught was being caused by a steam blower into the ash pit, but I have heard of such cases and believe they occur. The precaution of providing an interlocking device on the furnace door which will shut off the blower before the door can be fully unlatched, and which, I understand, has been adopted in some of the plants of the Du Pont Company, is a valuable one, and its value should undoubtedly be brought to the attention of every user of forced draught, whether the draught is caused by a steam blower or a fan. It is conceivable that the arrangement could be cheaply and satisfactorily installed and, so long as it was kept in order, would positively prevent the evident danger.

It is thought by some, and I believe not without basis, that the opening of a furnace door and the resultant admittance of air to the fire box causes explosion of gases which have accumulated in the space above the fire, even though the damper may be open. It is difficult to see how any considerable quantity of gas would accumulate and remain in the fire box when the damper is open; yet apparently such conditions have existed.

A good many householders who burn coal in some sort of furnace, such as the hot air type, will have at some time noticed that, after filling up the furnace with fresh coal for over-night banking purposes, all flame disappears, and in 5 or 10 minutes, if the furnace door is opened and a rush of air is caused to enter the furnace door by fanning across the space with a newspaper or even blowing into the furnace, there will be a sudden burst of flame up through the

coal, and, while it is not in the nature of an explosion, it is conceivable that if the fire area were large, as it is in the case of steam boilers, and the quantity of coal proportionately large, then the sudden bursting into flame would take the appearance of an explosion.

The only safety measures which suggest themselves to me in connection with prevention of furnace gas explosion or injuries resulting from unpreventable explosions are, first, the providing of a proper latch for the furnace door, and, second, the careful education of the firemen in how to perform their duties. It is rather an intangible subject and one which I find difficulty in discussing except in the abstract.

Making Safety Bulletins Attractive

By Clarence T. Hubbard

TWO men, emerging from a factory elevator, walked side by side toward their department. One of the men, slowing his pace, spoke to his companion: "What is on the bulletin today, Joe?"

"Oh, some more safety notices, I guess," was the reply, upon the utter-

"THE MAN WHO LOSES ONE EYE OFTENTIMES WEARS THE OTHER ONE OUT LOOKING FOR A JOB"

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ance of which both men resumed their journey without even so much as a look at the board.

The action of the two workers is a common example of similar happenings which every day occur throughout the country. The bulletin boards of many firms and factories, while containing excellent advice as to how to prevent accidents, are passed unheeded. Realizing this, a Hartford insurance company hit upon a new plan for attracting the eye of the worker toward notices designed for his benefit.

It was decided to capitalize the same measures which caused the average man to turn over 6 pages of well prepared advice and information on all good things to reach a section which is devoted to comic pictures—that of appealing to the worker with cartoons containing an element of humor. That this has worked out successfully is demonstrated in the large requisitions which the company has received from insured who have demonstrated their desire to secure such form of appeal as a means of awakening the interest of their employes toward the thought of accident prevention.

IMPRESSIVE BULLETINS

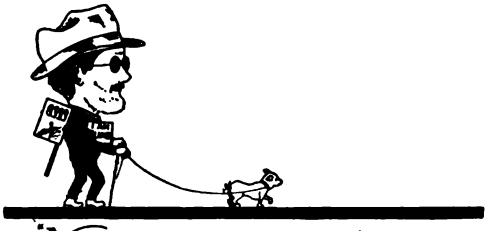
A series of bulletins devoted almost entirely to illustration of the cartoon kind is issued. The wording, which is limited, is prepared along the slogan type. In fact, the "copy" is the kind which one worker will repeat to another as well as to outsiders in his delight to impart information which, in his mind, is inclined to be clever. What the cartoons accomplish for newspapers the bulletins accomplish for accident prevention. They get the attention.

To make the series popular and consistent the information is arranged to come in from the insurance company itself or a committee on safety, but from a fictitious character known as "The Doctor." Each bulletin is headed in capitals with the words "The Doctor Says." Under the caption an attractive

illustration appears in pen drawing and then beneath the cartoon a slogan devoted to advice on safety measures.

A good example of what is being accomplished in this direction is found in

THE DOCTOR SAYS



"WE ONCE KNEW A MAN WHO COULDN'T SEE THE NEED FOR WEARING GOGGLES – NOW HE CAN'T SEE THE GOGGLES"

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the popularity of the bulletin which, under the heading of "The Doctor Says," contained a sketch of a blind man making his way with difficulty, while below the picture these easily remembered yet impressive words appeared:

> WE ONCE KNEW A MAN WHO COULDN'T SEE THE NEED FOR WEARING GOGGLES. NOW HE CAN'T SEE THE GOGGLES.

Another impressive bulletin along this type appeared in the following illustrated epigram:

> THE MAN WHO LOSES ONE EYE OFTENTIMES WEARS THE OTHER ONE OUT LOOKING FOR A JOB.

It can be readily seen where a poster of this sort will not only win a man's attention but also his approval, for, while he may smile when he first reads the bulletin, he nevertheless grasps the acumen of the statement.

Another bulletin in the series, based more on the "reason why" type, depicted in pen cartoon a ditch digger sitting on the end of a large sewer pipe while another wielder of the pick and spade was seen endeavoring to remove something from his companion's eye by means of a large pick. Then "The Doctor" drove home the point in this epigrammatical form:

> YOU WOULDN'T CALL ON A PLUMBER TO TINKER WITH YOUR WATCH. WHY ASK A DITCH DIGGER TO PICK AT YOUR EYES?

The new form bulletin series is occasionally punctuated with an illustrated poster, of semi-humorous form, which has no bearing whatever on safety measures, but which in its illustration and copy serves to give out good advice. This plan has assisted in further stimulating the attention of employes, as it has impressed them with the fact that the company is not trying to rub in safety "do's" and "don'ts" at every turn.

Supplementing the posters a few others of a more serious nature are inter-

THE DOCTOR SAYS:

"YOU WOULDN'T CALL ON A PLUMBER TO TINKER WITH YOUR WATCH; WHY ASK A DITCH DIGGER TO PICK AT YOUR EYES"

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spersed, which are also a bit separate from the safety ideas in order to keep the series from getting commonplace. A refreshing poster of this character was found in the issue where "The Doctor" advised by picture that "Life insurance has kept many a widow from being lonesome." This thought met with the hearty approval of all employers and in its attractive way aided in driving home good thoughts.

"The Doctor" is a character designed to remain with the Hartford company's series of safety bulletins and is to be congratulated, as he has in a large measure rejuvenated the employees' bulletin board.

Some Statistics With Reference to Marine Fire Hazard

By Frederick S. Titsworth, C. E., E. M.

Associate Member, Society of Naval Architects and Marine Engineers

Proceedings of American Society of Safety Engineers

FIRE on shipboard is generally considered to be one of the most dreaded perils of the sea. The report of the Supervising Inspector General of the Steamboat Inspection Service, U. S. Department of Commerce, for the year ended June 30, 1914, states: "It is believed that the greatest peril which has to be met on board ship is fire." Notwithstanding this fact, it is a difficult matter to compile statistics on the subject. Fortunately, however, United States statutes compel shipowners to make full reports of casualties to the supervising inspectors of the several districts, from whom they are sent to the Supervising General of the Steamboat Inspection Service in Washington, D. C., and by him compiled and reported each year.

In the interest of the preservation of the lives of those who "go down to the sea in ships" and the conservation of the enormous values in the hulls and the cargo which they transport, this summary and comment with respect to ship losses by fire is submitted. It is hoped that the facts and figures herein set forth may awaken those interested to the knowledge of the large percentage of losses by fire in relation to total marine losses, and to the necessity, if we are to succeed with an American Merchant Marine, of reducing this marine hazard to a minimum.

The facts herein submitted may for convenience be grouped under the following heads:

I. Marine property losses by fire.

II. Location of the source of fires on shipboard.

III. Lives lost and casualties by ship fires.

IV. Causes of marine fires.

V. Remedial suggestions.

I. MARINE PROPERTY LOSSES BY FIRE

The following figures are taken from the annual reports of the Supervising Inspector General, Steamboat Inspection Service, U. S. Department of Commerce, and relate only to property losses of hulls and cargo under United States registry. The figures given are by districts:

District 1, comprising ports of San Francisco, Honolulu, Los Angeles, Portland.

District 2, comprising ports of New York, Albany, New Haven, Philadelphia.

District 3, comprising ports of Norfolk, Baltimore, Charleston, Jacksonville, Savannah.

District 4, comprising St. Louis, Dubuque.

District 5, comprising ports of Boston, Bangor, New London, Portland, Providence.

District 6, comprising Louisville, Evansville, Memphis, Nashville.

District 7, comprising Pittsburgh, Cincinnati, Point Pleasant.

District 8, comprising Detroit, Chicago, Duluth, Grand Haven, Marquette, Milwaukee, Port Huron.

District 9, comprising Cleveland, Buffalo, Burlington, Oswego, Toledo.

District 10, comprising New Orleans, Apalachicola, Galveston, Mobile, San Juan, Tampa.

*District 11, comprising Seattle, Juneau and St. Michael.

District	Total Property Lost	Property Lost By Fire	Percentage
(Year ended December 31, 1911)			
1	$1,480,412	$191,628	12.94%
2	1,684,715	147,844	8.78
3	337,490	93,800	27.79

*Annual report for year ended June 30, 1918, together with all previous reports contain no distribution under District 11, these three ports being included in District 1.

District	Total Property Lost	Property Lost By Fire	Percentage
(Year ended December 31, 1911)			
4	42,750	5,000	11.70
5	231,550	35,300	15.25
6	105,650	73,500	69.57
7	66,525	11,200	16.84
8	803,297	135,950	16.92
9	408,315	288,200	70.58
10	74,463	35,900	48.21
Total ...	$5,235,185	$1,018,322	19.45%
(January 1 to June 30, 1912)			
1	$430,847	$43,625	10.13%
2	253,085	58,450	23.08
3	327,050	3,075	9.40
4	12,700	.....	.....
5	648,190	200,000	30.86
6	35,000	22,400	64.00
7	40,400	13,000	32.18
8	155,431	36,700	23.61
9	28,810	11,600	40.26
10	245,350	60,000	24.45
Total ...	$2,176,863	$448,850	20.62%
(Year ended June 30, 1913)			
1	$2,270,695	$196,250	8.64%
2	788,278	171,128	21.71
3	827,585	109,000	13.17
4	14,500	7,000	48.28
5	360,919	16,750	4.64
6	198,761	78,850	39.67
7	49,625	16,100	32.44
8	936,350	33,367	3.56
9	134,395	12,550	9.34
10	128,989	67,622	52.42
Total ...	$5,710,097	$708,617	12.40%
(Year ended June 30, 1914)			
1	$1,720,010	$313,600	18.23%
2	1,433,803	94,819	6.61
3	197,389	52,000	26.34
4	61,603	150	.24
5	762,477	97,650	12.81
6	130,403	54,200	41.56
7	47,960	18,400	38.37
8	3,383,553	146,500	4.33
9	464,636	28,600	6.15
10	261,100	171,800	65.80
Total ...	$8,462,934	$977,719	11.55%
(Year ended June 30, 1915)			
1	$2,040,100	$491,300	24.08%
2	4,685,289	648,054	13.83
3	393,340	137,000	34.83
4	18,170	1,150	6.33
5	341,960	40,229	11.76
6	135,225	85,200	63.01
7	84,635	69,000	81.53
8	627,902	121,150	19.29
9	107,471	23,700	22.05
10	252,650	70,500	27.90
Total ...	$8,686,742	$1,687,283	19.42%

District	Total Property Lost	Property Lost By Fire	Percentage
(Year ended June 30, 1916)			
1	$2,753,978	$111,270	4.04%
2	2,514,764	214,480	8.53
3	180,263	75,630	41.96
4	9,088	1,500	16.51
5	417,889	49,850	11.93
6	158,800	36,000	22.67
7	215,931	82,515	38.21
8	859,751	81,575	9.49
9	141,097	12,700	9.00
10	818,775	157,100	19.19
Total ...	$8,070,336	$822,620	10.19%
(Year ended June 30, 1917)			
1	$2,171,822	$1,205,300	55.50%
2	19,863,026	310,921	1.57
3	174,162	45,515	26.13
4	88,085	4,050	4.60
5	1,106,835	62,600	5.66
6	193,827	116,250	59.98
7	108,115	.....	.....
8	624,088	200	.32
9	783,975	40,000	5.10
10	823,430	19,750	2.40
Total ...	$25,937,365	$1,804,586	6.96%
(Year ended June 30, 1918)			
1	$4,444,347	$999,850	22.50%
2	35,328,903	2,491,517	7.05
3	452,383	57,810	12.78
4	87,600	6,500	7.42
5	1,305,887	180,937	13.86
6	574,600	9,050	1.58
7	557,574	105,700	18.96
8	851,356	19,550	2.30
9	405,808	30,000	7.39
10	1,567,354	407,100	25.97
Total ...	$45,575,812	$4,308,014	9.45%
(Year ended June 30, 1919)			
1	$4,724,610	$899,000	19.03%
2	17,841,662	1,879,574	10.53
3	1,207,760	866,900	71.78
4	161,075	19,500	12.11
5	4,546,679	859,600	18.91
6	275,418	215,500	78.24
7	51,580	3,000	5.82
8	1,811,024	38,300	2.11
9	2,629,878	6,000	.23
10	1,153,390	417,000	36.15
11	606,550	195,000	32.15
Total ...	$35,109,626	$5,399,374	15.38%
(Year ended June 30, 1920)			
1	$2,166,735	$221,750	10.23%
2	12,457,768	1,361,072	10.93
3	2,252,450	431,300	19.15
4	48,179	1,200	2.48
5	3,326,999	23,600	.71
6	114,510	38,500	33.62

District	Total Property Lost	Property Lost By Fire	Percentage
	(Year ended June 30, 1920)		
7	63,800	5,100	7.99
8	1,467,275	122,800	8.37
9	338,744	65,000	19.19
10	3,267,060	1,231,725	37.70
11	747,798	108,600	14.52
Total ...	$26,251,318	$3,610,647	13.75%
	SUMMARY		
Dec. 31, '11	$5,235,185	$1,018,322	19.45%
June 30, '12*	2,176,863	448,850	20.62
" 30, '13	5,710,097	708,617	12.40
" 30, '14	8,462,934	977,719	11.55
" 30, '15	8,686,742	1,687,283	19.42
" 30, '16	8,070,336	822,620	10.19
" 30, '17	25,937,365	1,804,586	6.96
" 30, '18	45,575,812	4,308,014	9.45
" 30, '19	35,109,626	5,399,374	15.38
" 30, '20	26,251,318	3,610,647	13.75
9½ years Total	$171,216,278	$20,786,032	12.14%

*Period of 6 months only.

It will be noted from the above that of all property losses reported for the last 10 years, amounting to $171,216,278, loss of $20,786,032 was occasioned by fire, constituting 12.14 per cent of the total. Leaving out of consideration the two war years, 1917 and 1918, this percentage would be 14.71 per cent.

II. LOCATION OF FIRES ON SHIPBOARD

The next question naturally arises: Where do the fires originate which caused the enormous losses above tabulated? It would be useless to attempt to suggest any remedy for cutting down these losses without first answering this question. Resort was had in the following tables to marine casualties reported in the New York *Maritime Register*. A period of six years is covered by the following:

Year	Fires	Tonnage involved	Cargo	Bunkers	Above decks	Engine room	Miscellaneous
1914	33	169,397	15	10	1	1	6
1915	39	200,314	33	1	..	..	5
1916	74	315,507	46	11	7	2	8
1917*	44	191,155	25	7	3	2	7
1918*	26	147,825	17	6	..	..	3
1919	62	351,904	38	16	1	1	6
1920	66	390,382	33	17	2	5	9
Total	344	1,766,484	207	68	14	11	44

*The small number of fires reported during these 2 years is probably due to the fact that it was at the time of the United States' entry in the war and all casualties were not reported.

The foregoing table shows the origin of fires in *vessels of foreign registry* of 2,500 gross tons and over; the periods given are for years ended December 31.

It will be noted from the above that the number of fires has steadily increased. This cannot be accounted for in the increase of the world's tonnage, and demonstrates clearly that the fire hazard is increasing rather than diminishing.

Designating the fires in passenger vessels, we observe the proportionately small number of fires in passenger as compared to non-passenger vessels:

Year	Total Fires	Fires in Passenger Vessels	
1914	33	3 (cargo fires)	10%
1915	39	3 (cargo fires)	8
1916	74		
1917	44	1 (cargo fire)	2
1918	26	1 (cargo fire)	4
1919	62	3 (cargo fires)	5
1920	66	2 (vessels under construction)	3
Total	344	13	3.7%

Practically 85 per cent of all the fires occurring in passenger vessels during this period were cargo fires, and only 2 out of the 13 did not originate in the cargo, and these 2 fires occurred while the vessels were under construction.

The following table shows the origin of losses by fire in ships of American registry of over 2,500 tons, for years 1919, 1920, periods ended December 31:

American Registry, excluding U. S. Shipping Board vessels.

Year	Fires	Tonnage involved	Cargo	Bunker	Tanker	Eng. room	Above decks	Miscellaneous
1919....	24	106,541	15	6	..	2	..	1
1920....	32	141,559	14	4	5	6	2	1
Total...	56	248,100	29	10	5	8	2	2

Again, the following table shows the small percentage of fires occurring in

passenger vessels as compared to those occurring in non-passenger vessels:

American Registry, excluding U. S. Shipping Board vessels.

Year	Total Fires	Fires in passenger vessels	
1919	24	6 (5 cargo, 1 bunker)	25%
1920	32	2 (1 eng. room and 1 superstructure)	7
Total	56	8	14%

The same tabulations for vessels of the U. S. Shipping Board of 2,500 tons or over show the following results, periods years ended December 31:

Year	Fires	Tonnage involved	Cargo	Bunker	Tankers	Eng. room	Above decks	Miscellaneous
1919....	19	83,432	10	6	..	2	..	1
1920....	60	287,871	28	16	..	5	..	11
Total...	79	371,303	38	22	...	7	..	12

Year	Total Fires	Fires in passenger vessels	
1919	19	1 (Engine room)	5%
1920	60	1	1.8
Total	79	2	3%

It may be said that the greater number of fires in non-passenger vessels is accounted for by the fact that they vastly outnumber the passenger ships. A reference to actual figures will therefore be illuminating. According to statistics compiled by Maxwell Ballard, read before the Northeast Coast Institution of Engineers and Shipbuilders, December 17, 1920, the total world tonnage "excluding wood, composite and iron vessels" in 1914 equaled 42,019,515 tons. Of this amount, 13,345,255 tons were "liners, passenger and intermediate vessels of 12 knots and above." In 1920 these figures were, respectively, 49,848,335 and 12,106,594. Thus, in 1914 non-passenger vessels composed approximately 70 per cent of the total tonnage and in 1920 approximately 75 per cent. By way of comparison the following shows percentages of fires in non-passenger ships, of total fires:

Vessels	Total fires 1919 and 1920	Fires on passenger ships	% of fires on non-passenger ships
Foreign Registry ..	128	5	96%
American Registry..	56	8	86
U. S. Shipping Board	79	2	97
Total	263	15	94%

Assuming, as indicated above, 75% of the world's seagoing steamers are non-passenger vessels, it is seen that the large percentage of non-passenger vessel fires (94%) is not accounted for by the excessive number of non-passenger vessels over passenger vessels.

To illustrate: Let us assume 100 fires reported. If there were no greater fire hazard on non-passenger than on passenger vessels we would expect to find that 75 of these fires (or 75%) occurred on non-passenger vessels and 25 fires (or 25%) on passenger vessels. But as a matter of fact we find that 94 (or 94%) actually occurred on non-passenger vessels, and only 6 (or 6%) on passenger vessels. In other words, there are 15⅔ fires on non-passenger vessels to every fire on a passenger vessel. But there is three times more non-passenger tonnage than there is passenger tonnage. Therefore, if we equalized the tonnage between non-passenger and passenger vessels we would have ⅓ the former tonnage and consequently ⅓ the number of non-passenger fires (⅓ of 15⅔ or 5 1/5 fires). This would account for the greater number of fires due to the larger amount of non-passenger tonnage, but indicates that, as we may expect 5 1/5 fires on non-passenger vessels to every fire on a passenger vessel, the fire hazard is 5 1/5 times greater on non-passenger vessels.

MARINE FIRES, SIX YEAR PERIOD

The following tabulation gives an interesting story about all the marine fires which have occurred during the last 6 years on vessels of 2,500 gross tons or over:

(World's tonnage, 2,500 gross tons and over)

Location	Number of fires	Percentage of total
Cargo	392	47%
Oil bunker	4	.4
Bunker (coal)	119	14
Superstructure	66	7.6
Engine room	29	3
Miscellaneous*	225	28
Total fires	835	100%

*This includes all fires reported of which origin was not specified, and undoubtedly a large percentage of them were also cargo fires or below decks.

Of the total 835 fires, it is thus seen that 544 originated below decks, or 65%. Of these 544 originating below decks, there were 392 cargo fires, or 72% of all fires originating below decks were cargo fires.

III. LIVES LOST AND CASUALTIES BY SHIP FIRES

The following tables taken from the reports of the United States Steamboat Inspection Service will give some idea of the relative proportions of casualties from ship fires compared to the total lost from all other causes; years ended June 30:

Year	Total Lives Lost	Lives Lost by Fire
1910	379	21
1911	392	10
1912	264	4
1913	436	7
1914	582	10
1915	368	1
1916	1,276	7
1917	592	2
1918	500	7
1919	543	45
1920	470	1
Total	5,802*	115—2%

*Includes suicides.

In other words, of all the lives lost on the sea from all causes, approximately 2% were lost by fire.

The following, taken from the same records, shows the *casualties,* exclusive of suicides and violations of the law, reported in the several districts specifying those caused by fire; years ended June 30:

Year	Total Casualties	Caused by Fire
1916	1,299	81
1917	1,287	68
1918	1,287	92
1919	1,073	80
1920	1,501	134
Total	6,447	455—7%

It will be noted that of the total lives lost in shipping, about 2% were caused by fire, and of the total casualties exclusive of suicides reported, about 7% were directly traced to fire causes. As a comparison it is rather startling to note that the violent deaths other than suicide in the United States during the year 1920 were only 4.9% of the total deaths. Under "violent deaths" are, of course, included, in addition to fire, railroad, automobile and machinery accidents, tornadoes, floods, etc. Also, of all the casualties recorded in the United States troops engaged in the World War, 4.5% died from wounds. So it would seem from the above that the casualties and deaths resulting from fire on board ship are abnormally large and proportionately far greater than they are on land.

IV. CAUSES OF MARINE FIRES

We list below a few of the more important causes of ship fires, not attempting to give them the proper order of importance or frequency of occurrence:

Oxidation of bunker coal.
Fuel oil.
Breaking of pipes.
Careless filling of tanks.
Inflammable vapor.
Defective wiring.
Harbor fires, communicated from wharves.
Spontaneous combustion in cargo.
Carelessness of stevedores and crew.
Smoking—matches.
Friction due to shifting of cargo.
Rodents.
Lamps and torches.
Fumigation.
Stoves.
Lightning.
Steam pipes.

It will be noted that, while many of these causes can be eliminated by special precautions of the master and crew, the majority of them are impossible of prevention in spite of all the ship operators can do. Cargoes accepted and stored are boxed in such a way as to make it utterly impracticable to ascertain their contents or whether sufficient care was used in packing. For instance, fires are frequently discovered in the center of cotton bales. The only possible explanation attributes the fire to carelessness in smoking or the dropping of a spark in the cotton at the gin.

V. REMEDIAL SUGGESTIONS

Because of the peculiar psychology of the human race—a great deal of which may be due to the attitude of mind attendant on the keen competition now existing in the social order—man finds it

necessary to legislate in the interests of his own self preservation. Witness the laws, rules and regulations compelling the use of safety appliances of all sorts, such as fire escapes on buildings, safety gates at grade crossings, laws relating to sanitation, factory inspection, automatic couplers on railroad cars, etc. In fact, our whole system of steamboat inspection service under the U. S. Department of Commerce has been developed for this very reason. Safety costs money, but it is only fair and just that all should be compelled to take the same reasonable precautions and that no one should be permitted to gain undue advantage by limiting his expense therefor, thereby increasing profits at the expense of human life and destruction of property. This was undoubtedly in the minds of the Congress of the United States when in 1905 Section 4470 of the U. S. Revised Statutes was passed, reading in part as follows:

"Every steamer carrying passengers or freight shall be provided with suitable pipes and valves attached to the boiler to convey steam into the hold and to the different compartments thereof to extinguish fire, or such other suitable apparatus as may be prescribed by the regulations of the board of supervising inspectors, with the approval of the Secretary of Commerce, for extinguishing fire in the hold and compartments thereof by the introduction through pipes into such hold and compartments of carbonic acid gas or other fire-extinguishing gas or vapor . . . . . ."

Then follows other specific regulations as to fire pumps, stowage of inflammable material, etc.

It will be noted that in the language quoted above no mandatory provision is made to cover installation of approved apparatus for *detecting* the presence of fire. One of the fundamental principles in fighting a fire is to begin the attack as soon as combustion develops.

The last published report of the Fire Department of the City of New York, noted for its great efficiency, for the year ended December 31, 1918, records 13,971 fires extinguished. Of this number, 9,203 were confined to the starting point and 8,229 were extinguished without an engine stream. Of these fires, 201 were in vessels. It is interesting to note that, of all the number of fires in Greater New York of this year, 91.99% resulted in a property loss of only $1,000 or less, total loss for the year 1918 being $9,538,725, the average loss $682.75. In 1917 there were 14,053 fires, with an average loss of $1,016.05. This tells the story of the promptness with which these fires were attacked and extinguished, and no further comment appears to be necessary to prove the great saving made by this method.

Based upon the authority delegated by Congress in Section 4472 of the Revised Statutes—reading as follows: "All such other provisions shall be made on every steamer carrying passengers or freight to guard against and extinguish fire as shall be prescribed by the Board of Supervising Inspectors and approved by the Secretary of Commerce"—the Board of Supervising Inspectors of the Steamboat Inspection Service promulgated the following regulation entitled "Automatic Fire Alarm System" (Par. 14, of Ocean and Coastwise, Rule IV, Edition of May 14, 1920):

"All steamers of more than 150 ft. in length under the jurisdiction of the Steamboat Inspection Service, whose construction is contracted for after June 30, 1916, which are provided with staterooms or other sleeping quarters for passengers, shall be equipped with an efficient fire-alarm system or indicator which will automatically register, at some central point or station where it can be most quickly observed by the officers or crew of the steamer, the presence or indication of fire in the staterooms and *various other compartments of the steamer which are not accessible to the observation of officers or crew.*"

This would seem to require a fire indicating system in all the inaccessible holds and other compartments of every passenger vessel. But this is not the interpretation of the Steamboat Inspection Service, as it has never been the practice to require fire detecting systems in any other part than the staterooms and superstructure of passenger vessels. No fire detecting system has ever been required in the holds and inaccessible cargo compartments of passenger or non-passenger vessels.

From the tabulation of the location of fires on shipboard hereinabove given it is clearly shown that the greatest danger from fire on shipboard lies in the holds and cargo compartments on passenger and non-passenger vessels, the hazard

being greater in vessels of the latter class.

The American delegation at the International Conference on Safety of Life at Sea, which took place in London on November 10, 1913, and January 20, 1914, presented the following preamble and resolutions on fire, its prevention, detection and extinguishing, which was unanimously adopted:

Of all the dangers and vicissitudes to which humanity is subject, none is so insidious in its origin, persistent in its encroachment and appalling in its effect as fire, and of all the elements none is so susceptible of control.

No possible preparation may be made which will lessen the force of the tornado or control the appalling attack of the typhoon. It is not within the power of human precaution to ease the alarming velocity of the hurricane and its consequent disastrous effect, or to divert the approach of the stealthy pampero, and, while it may be possible in this day of scientific navigation attainments to avoid, to a certain extent, these dangers at sea, when they *are* not, the gale must be ridden out under the conditions that the ship may best and most readily respond *to*. Science, strength of material and the result of man's handicraft under carefully calculated data may confine water under the ordinary conditions which it is proposed to meet, but the cloudburst, continued heavy rains or swollen feeders carrying extraordinary volumes of water set at nought the finest calculations of the engineer and scientist, and release the flood that is irresistible in its force, carrying death and destruction in its way until its terrors are spent in the division of its volume over wider paths. The great force of the ocean wave may be materially softened by the skillful maneuvering of the ship, but no human effort may control its relentless fury, and the majesty of its wrath may only be met by the weakness of man or the defense of the ship which is the object of its attack.

Fire, which is appalling enough when it is encountered on shore, where the means to fight it and the agency of attack is under the control of numbers of men skilled in the manipulation of effective apparatus and educated by experience in meeting fire under varying conditions of location and different stages of progress—but the alarm of fire at sea is the most distressing of the many contingencies which the sailor and the passenger is called upon to face, carrying doubt and hesitation to the mind of one and terror to the heart of the other. Isolated upon the face of the sea, with nothing but limited force and means to fight it, the man in command must rely upon judgment and discretion alone in coping with this insidious foe. With the fire in an inaccessible compartment and with no accurate knowledge of its extent or progress, he can only utilize the limited means of attack at his command and endeavor to control it if its proportions have reached a stage where it is impossible to extinguish it. If the attack is repulsed the passengers and crew are driven from their foothold and made to take refuge in the boats and place themselves at the mercy of the turbulent ocean; nothing to fall back upon, as on the land, and no refuge but the face of the open sea.

No exaggeration of such a deplorable calamity is attempted, but rather an uncolored picture of what may happen at any time, and of which we have had within the last few months such startling examples, and which, except for the application of Marconi's adaptation of that generous gift of God, the radio-telegraph, would have proven as horrible in their details and as harrowing in their account as any disaster of recent years. That the terrors of this common foe may be defeated and its horrors mitigated you must all agree; that the chances of fire may be made remote we must all acknowledge; and it would seem that this great congress of the Nations, assembled for the humane purpose of securing the safety of life at sea cannot conclude its work without taking into consideration this important and necessary subject.

Fire may, to a great extent, be prevented by the prohibition of dangerous cargo, by care in its stowage and the exercise of judgment and discretion in its location. It may be detected by any one of the many devices that assist the senses, and it may be extinguished by the application of agencies at our command. With this assurance, and with confidence in our strength to overcome this great danger, the American delegation has proposed the following resolution:

"RESOLVED, That the American delegation proposes the following principle for the consideration of this sub-committee, and requests its adoption and endorsement:

"That the several States signatory to this Conference agree to enact such legislation as will to the fullest possible extent provide for the prevention, detection and extinguishing of fire on shipboard, the details of the installation and application of such law to be regulated and arranged by the several signatory States."

Unfortunately, the forward step contemplated to be taken as recommended by this International Conference was never taken. In spite of the fact that the resolution was presented by the American delegation, the Convention itself was not ratified by the United States.

From the above, does it not seem expedient at this time for Congress to amend the Federal law and compel the installation of suitable fire detecting appliances on all passenger and non-passenger ships, particularly in the inaccessible holds and cargo compartments; such systems only to be permitted as may meet a thorough inspection and full ap-

proval of the Steamboat Inspection Service?

Such a system of fire detection and extinction for use on ships should provide the following:

1. The means to ascertain when and where combustion is taking place before active conflagration begins, in order that the extinguishing medium may be applied immediately at the source of the fire without needlessly damaging cargo by applying an excess quantity of the medium or by applying it where it is not needed.

2. The means to fight the fire without opening hatches or endangering the lives of the crew by sending them into smoke-filled compartments to investigate the location of the fire or to extinguish it.

3. Means to fight the fire without unnecessarily alarming the passengers and crew.

4. Means to determine whether or not the fire is gaining headway and spreading to other parts of the ship.

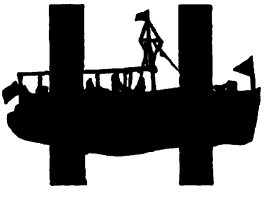
5. Means to determine whether the fire breaks out again after having been supposedly extinguished.

STORY OF FIRE AT SEA

In closing, may I be permitted to repeat the story of an actual fire at sea as it was related to me? My friends were the unfortunate sufferers.

"On September 14, 1916, I was sitting on deck of S. S. *Congress* of the Pacific Coast S. S. Company, en route to Seattle. We were off the coast of Oregon, near Coos Bay, at Marshfield. I noticed a small wisp of smoke curling up around the hatchway and watched it for a few minutes, thinking at first it was a lighted cigarette. As it persisted, I called the attention of a deck hand, who immediately gave the alarm. This was about 2 o'clock in the afternoon. Fortunately, the sea was smooth and the weather beautiful. As soon as the alarm was given investigation began, and when the hatches were opened below the ship was enveloped in dense smoke. We had 252 passengers on board and a crew of 175. In 30 minutes we were ordered to put on life preservers and refused permission to take any baggage from the staterooms. Smoke was so thick one could not stop to dress. We were at that time about 2 miles from the shore. The crew fought the fire with all the available hose, and within a very short time we were ordered to abandon the ship. Within 3 hours from the first alarm the ship was a blazing mass and all the passengers and crew were lowered in the boats. Fortunately, the Government dredge *Colonel P. S. Michie* came to our rescue and we all clambered aboard, but when our boat was being lowered the rope broke and we dropped some 10 or 15 ft. into the water. We were thankful to escape with our lives. The rapid progress of the fire after the first smoke was discovered showed that the fire must have been burning for several hours. The boat was only about 3 years old and was built at a cost of $1,230,000. I personally lost all my wardrobe and money. The steward had some $10,000 in the company's money in the ship's safe, as the crew was to be paid off. One of the passengers had to be pulled through a 12-in. porthole. Many members of the crew and passengers were overcome with the smoke, but there were no lives lost."

Surely, a disaster of this kind could have been avoided if the ship had been provided with a fire detecting system, but we regret that we are forced to conclude that until a law is passed making mandatory the use of fire detecting and extinguishing apparatus on board ship such disasters with their usual accompaniment of loss of life and destruction of property are bound to occur.



Methods and Precautions Necessary in Steel Frame and Wall Bearing Building Wrecking

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Proceedings of American Society of Safety Engineers

THE steel frame and iron, wall bearing, type of buildings which are now being wrecked generally are in the downtown section of New York and are old style buildings, principally, but in some cases are of comparatively recent construction. Wrecking methods of each type vary in some important details, which will be taken care of as well as possible in this paper.

In the comparatively recent construction we have the usual steel frame with all members riveted together. Wall bearing buildings are of the period 1880 to 1900 and have cast-iron columns for interior bearing and wrought iron I-beams, all of which members are bolted together. Cast-iron lintels bridge the window openings. The front elevations of these buildings are generally marble, granite or limestone, backed up with brick.

Brick work in recent all steel construction is about half the thickness of enclosing walls of wall-bearing iron construction. Wall bearing buildings seldom exceed 12 stories in height and walls generally are 32 in. thick at street level, thinning out to 16 in. at top floor. On these old buildings, the stone is heavy, in large pieces, as for instance, lintels weighing 3 tons and coping and courses weighing in some cases 10 tons.

Floor arches of wall bearing buildings are yellow clay tile or brick, arching from beam to beam and will not stand as much debris as modern red tile construction. Often men are seriously hurt and even killed by the failure of old style arches during demolition. The floor arches are covered with a fill of ash concrete and 4 x 4 in. scantlings, covered with wooden flooring. In some cases we have the Mansard roof, or French type of roof, covered with slate. You meet with hanging ceilings, now and then, and as a rule they are dangerous and should be removed immediately. I have known of cases where they have dropped (the whole ceiling has dropped) for no apparent reason, but probably from vibration of wrecking operations.

In all steel frame building wrecking or wall bearing type, a guy derrick should be used for the reason that while there is lost motion in booming up to escape the guys there are compensating advantages principally in the lowering of the derrick when it is to be placed on a lower floor. A guy derrick can be taken down and set up on one or two floors below in about two hours, while a stiff-leg derrick would consume a day and a half for the same operation. Also, the guy derrick being turned from the mast, better and safer control of the swinging load is obtained. Also guy derrick covers all points while stiff leg is limited to a ¾ swing. This derrick is used for the dismembering of steel and the lowering of the wrecked material directly to trucks in the roadway and for short storage on the sidewalk shed.

The first proceeding is for the wrecking contractor to disconnect the service lines, leading into the building, of gas and electricity, the water connections to remain. A sidewalk shed should then be immediately constructed for the protection of the public using the sidewalk in front of the building. This shed should be constructed before anything else is done, whatsoever—before any wrecking of any character is done, with the exception of the severing of the service connections.

This shed should be substantially constructed and the roof extend from a

point vertical with the curb to facade of building. It is important that the covering on this shed should butt against the front of the building to prevent possible falling materials from dropping between shed and wall and injuring passing public. In ordinary work of this kind the shed has a space of from 2′ to 3′ from the building, which is very poor practice. The upright posts of the sidewalk shed should be constructed of not less than 8″ square posts and horizontals, beams on these horizontals to be of 3 x 10″ planks and covered with 3″ planks.

For better fastening, upright posts of sidewalk shed should be placed on a stringer running parallel to curb but at least 12″ in from curb. Posts should not project beyond the curb side of stringer. This to prevent hubs of trucks from striking posts, which impact would not only knock out post but would cause truck to turn in front and skid dangerously outward in rear. In a double horse-drawn truck the pole would turn in and cripple the inside horse. Posts should be centered about 8′ and beams about 15″. The inner posts of the sidewalk shed should be lined with 7/8″ boards from the sidewalk level to the shed roof for protection of passing public.

On the outer edge of roof of shed should be a wood or wire mesh vertical protection about 4′ in height to prevent material from falling into street.

The shed is not only used for protection but also for the temporary storage of material waiting to be loaded into trucks. Trucks do not always appear as ordered or promised and so as not to delay the work, the derrick places this material on the shed temporarily. This is also done when conditions become congested on the building and more room is required for wrecking purposes. The use of shed for storage purposes should be to a limited extent and with caution.

There are a number of different kinds of work in progress on the start of the wrecking such as the sidewalk shed construction, roof removal, window glass removal, boarding up of the windows as soon as the glass is removed, lighting up of the stairways and different floor levels as soon as the windows are boarded up, partition removal, dismantling of all heating, plumbing and electrical equipment and chute construction. In most buildings there are one or more elevators. One elevator is left to run until removal of roof over elevator shaft exposes elevator overhead machinery and shaft. It is then dismantled. This elevator is used for the taking from each floor, radiators, doors, fixtures, etc., to the ground floor. From the ground floor they are carried across the sidewalk and loaded into trucks.

All the time this type of wrecking is going on, a jenny-wink derrick is being rigged on the roof, having been pulled up through the stairwell by block and fall. The engine, preferably operated electrically, being installed on the first floor or street grade floor. When power is obtained for engine the cables are attached by jenny-wink, holes being punched through the floors for this purpose.

The mast and boom of a size adequate for the work, are then raised separately to the roof and derrick erected, on the floor immediately below the roof if it is for a wall bearing type of construction. There should be 6 guys to the derrick and an extra loose guy which should be placed directly on a line behind the boom when it is lowered over the street for loading or when about to pick up an extra heavy load.

The guys should be preferably of plow steel and not galvanized wire, guys to be attached to the steel frame by hand manufactured wire anchors, not chains. All sling and spreader equipment for derrick to consist of hand manufactured wire type, no chains. All these hand manufactured wire anchors, slings, spreaders and bridles should have an equalizing feature to permit all parts to bear equal strain. Also for the lowering of small stone and small pieces of junk to trucks wooden scale boxes to be used with a 4-leg wire sling. All the sling and spreader equipment should be of wire with the exception of when the derrick is about to lift a beam or number of beams out of its framing, a 1″ rope sling should be used. This acts as a safety measure—should the beam be im-

bedded too strongly—or held by an overlooked bolt the rope will part before the derrick can be pulled down. A "spreader hook" sling is used to pile up the beams for a load on the wrecking floor. It is very essential that all derrick equipment be of first-class material and workmanship.

Wooden chutes are used to load trucks with brick and debris. The chutes should be not less than 40″ wide and 20″ high. A narrow chute would cause bricks and debris to jam. Bottom of chute should be of either 3″ yellow pine or 4″ spruce. Thinner plank would wear out and require difficult replacement. Yellow pine chute should not be as steep as spruce, becoming very slippery with use. Sometimes open sectional steel chutes are used within the building. These are 32″ wide and 8′ long, with 8″ sides, similar to a large coal chute. They are lapped at the ends and held together with wing nuts. These are ideal when bricks are to be lowered without damage to the bricks as they are smoother than lumber and need not be pitched so steep.

The main chute runs from the outer edge of the shed roof at about 50° angle for four floors; it then zigzags every two floors to the roof, but the zigzagging depends on the space in the building. At the point where the chute zigzags there is an opening to throw brick and debris so that workmen can be used on the different floor levels as well as at the point where walls are being razed.

At outer end of chute is a brake consisting of an obliquely hung door about 7′ to 8′ long 3″ plank, held together with cross boards, slightly narrower than chute width. The lower edge is flush with the lower end of the chute. The upper is held by three long strap hinges, screwed to the chute top. Nailed to side of chute, and jutting upwards vertically over end of chute, are two 3″ x 4″ posts, about 5′ high, crossed at the top by a 3″ x 4″ scantling. On this a light block is hung. A single rope through this raises the brake. The chute brake is held down by a 3″ x 4″ scantling placed upright between the crosspiece on which the block and fall hangs and a cleat on the end of the brake. This is when bricks are coming down and the chute is being filled.

In addition to this door or brake, there is another door or brake on hinges attached to the bottom end of the chute which is used primarily to convey the brick or debris from the end of the chute into the middle of the truck. When not in use, it is raised vertically and then acts as a secondary safety.

At the second floor level above the shed is a safety brake in the chute always in charge of a workman. There is only the zigzagging between this brake and the point where walls are being razed. It is, therefore, very essential that the safety brake and the brake at the end of chute should not be opened at the one and the same time. The brick and debris are held in the chute by the safety brake. About a truck load is allowed to be in the chute below the safety brake. On outer side of the truck is placed temporarily, a wooden shield about the length of the truck-body and 2½ to 3′ in height, while the truck is being loaded to prevent material from falling into roadway and injuring passing traffic. I have seen the shield broken to pieces and debris and brick fly for a distance of 20′ when, by some error, the safety brakes were opened at the same time. It might be said, Why not install some device that would prevent both brakes being opened at the same time? Perhaps we will get to that later, but we have not reached any conclusion up to the present time. Teams are also loaded with brick and debris inside the building on the first floor or the basement level. The regulation chute is constructed and runs three or four floors. By this method, debris on the first two floors is removed at the same time as debris from above. A plank team or truck runway is laid on the sidewalk into the building and the arches covered with 4″ planks for the truck or team loading. When planks are laid on the sidewalk, an additional plank is placed against the ends and sloped so as to prevent a tripping point. In addition it would always be well to see that the sidewalk is properly shored to take the load of truck passing over same.

Any material that falls from an 8-story

or 10-story building would, in most cases, land in the center of the roadway and not on the bridge. In order to prevent this, as well as a protection to men on the walls, an outrigger protection or platform should be installed every two stories. This outrigger should consist of 8" I-beams thrust out of the windows and the inner ends secured to the floor beams by wrought iron straps. Wooden beams should never be used as they are liable to be broken by chunks of brick from walls or other material.

These beams should be spaced about 8', extended outside the walls about 6' and covered with 3" planks. On the outer edge of these platforms should be installed a wire mesh protection about 4' in height. On a building I was inspecting, two of the top stories were of Mansard type and covered with slate. Each individual slate had to be removed separately. If the workmen had let fall the slate, the protection would have caught it, otherwise it would have fallen to the street and perhaps cut someone's head off. The same with a brick. You can get some disagreeable financial results from a brick falling on a passing man or woman. I know of a case where the injured party collected $40,000 for a brick falling from a building, and it was not a gold brick either.

In order to facilitate the wall wrecking where the walls are over a foot in thickness, and laid up in hard cement mortar, holes are drilled horizontally by air-operated drills on a center of about 18". In most cases, the men using these drills should wear respirators as the dust from this drilling is very thick and the drilling sometimes has to be done in confined places and the windows are generally boarded up—so respirators are quite essential and should be used.

After the holes are drilled, the drillers keeping one story below the wall men, the wall men drive wedges into the holes thereby loosening the brick which, if in chunks, is allowed to drop to the floor where these chunks are broken up by mauls, loaded into wheel-barrows or 2-wheeled carts and dumped into chute.

Heavy stone is loosened by pinch bar, hoisted inwards by derrick, and the derrick lowers same to truck in the street. The pinch bar is also used for the loosening of the brick. The pinch bar is *the* wrecking tool of the wrecker. They do wonderful things with this tool. It is a steel octagon bar about 4' in length, turned up or heeled on one end about 3" and sharpened to a wedge shape with tempering. It is wonderful what skilled wreckers can do with this bar. The steel frame is disconnected by acetylene burners. In wrecking parlance, this acetylene torch is called a burner. The beams are burned from the frame work and the connecting plates of columns, the derrick, of course, being attached to column or beam, while this is being done. In the wall-bearing type, the members being connected by bolts, the bolt heads are removed by wrench or knocked off with maul, the derrick having hold of the member being released.

On every two floors, the stairwells and elevator shaftways are covered to prevent brick and debris from falling below that level and also for the protection of the men. Heavy I-beams and 4" planks are used for this covering.

In some cases where conditions are right, pinch bars are placed in the drill holes for a scaffolding support, laborers working on this scaffolding in razing walls; otherwise they stand on the walls in loosening the brick with the pinch bars, or sit down, as scaffolding is not practical for this type of work. In most cases, false framework should be installed in all arched windows and overhanging coping should be shored as well as light shoring placed in windows for overhanging lintels.

As each story is wrecked, the derrick is lowered one story if for a wall-bearing construction and two stories if for steel frame building, as the columns are 2-story columns. As the wrecking reaches the story over the hoister, a covering is installed over same so the arches can be dropped or demolished. All buildings are wrecked to the sidewalk level and the basement left to what is called, "broom clean."

The leading exponent of this type of wrecking in 15 years' experience of tall building demolition, on the most crowded thoroughfares, has never seriously injured a pedestrian.

Accident Prevention in Shipbuilding

By Thomas A. Walsh

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Proceedings of American Society of Safety Engineers

FROM the subject assigned, one is inclined to believe that the matter of accident prevention work in shipbuilding is as comprehensive as that carried on in a machine shop or a similar industry housed, so to speak, under a single roof, and not made up of marked distinctions and trade separations as found in construction of ships.

The average shipbuilding plant is comprised of several small industries, each presenting its particular hazards, from those of the woodworking shop to the erection of steel on the various hulls under construction, and it is only by striving to combine the numerous trades with their various hazards and analyzing them as a unit that the important part of accident prevention work in this industry can be understood in a limited time.

Assuming that the above is true, it is probably just that the plant as a whole be considered first and in analyzing it determine, aside from the construction end, just where the highest accident frequency and severity is found.

Statistics have shown that this condition is found in the fabricating shop, and in some instances this one shop has carried 75% of total shop accidents. Such statistics lead one to believe that this very important production factor in the industry is unnecessarily costly in its operation.

HANDLING OF MATERIAL

The accidents making up this large percentage of cost are due mostly to the handling of material by hand and crane.

Where material is handled in gangs it is more efficient and safe to have such gangs made up of one nationality when there are various non-English speaking nationalities in the labor gangs as a whole.

While on the question of labor, it is perhaps worth while considering the importance of having as high a class of intelligent English speaking men in this department as in any other, this due to the high speed at which the machines are operated and usually the large number of overhead and other types of cranes operated in the shop.

In handling the material by cranes, particularly the plates, the clamp, or safety dog, is preferable to the flat hook, and in no instance should fabricated plate be carried through the use of a grab or plate hook inserted in the hole.

Where plates of excessive length are handled by the crane the material can be more safely handled through the use of a strong back or spreader in preference to the four-point sling radiating from the crane hook. This method will tend, when strong backs or spreaders are properly designed, to eliminate the bellying of plates, which causes the clamps and flat hook to get an insufficient purchase and slip, dropping the load.

The transporting of material in this shop should be carried on along clear aisle space, where possible, and in no instance higher than 5 ft. from the floor. Such practice will eliminate the hazard caused by carrying material over employes' heads.

In some fabricating shops it has been found good practice to provide crane hookers-on with whistles, which are used in conjunction with the use of the horn on the crane while carrying material.

In the above paragraph is mentioned the use of a horn on the cranes in this particular shop in preference to a bell, this based on the fact that tests have shown that the average bell tone has a tendency to syncronize with the sound of this shop and cannot be heard.

This condition has also been found to hold true relative to the use of warning signals on shipway cranes.

In conjunction with handling the larger pieces of material in this shop comes the hazard due to transporting the numerous small sections of angles; liners and other material are sometimes piled and carried in a cradle sling, a practice that creates a serious hazard and can be eliminated through the use of skips suspended by 3 or 4 cables to properly equalize the load.

As stated before, the accident frequency of the various shops that go to make up the industry is far in the minority when compared with that of hull construction. Nevertheless, this fact should not produce a tendency to slight these sections of the plant when it comes to providing efficient safeguards. The numerous machines of the various shops should be considered from the point of providing efficient guards for them as the various sections of the hulls under construction.

In designing machine guards for the various shops in the plant it is perhaps well to consider each shop separately as to the materials handled in it, their size, weight and how transported, then design the machine guards to meet the conditions above detailed. By considering these factors there will not be a tendency to provide guards suitable in construction for a shop doing exceptionally light work in one where the heaviest of manufacturing is carried on. This thought will relieve any worries from maintenance charges or upkeep after the installation is complete and which, in the end, amounts to considerably more than the first cost of the installation.

PILING AND STORING

Turning from the shop to the yard in general, one should here also consider the methods of piling and storing material, particularly in relation to railroad track clearances and to stability of piling.

In the storing of plate in this section of the plant it has been found more economical, not only from the standpoint of safety but also handling, to store plate in vertical racks, from which they can be quickly and safely removed through the use of a clamp attached to the crane hook.

Plates when set in vertical racks, if constructed of steel and concrete, should rest upon timbers set in the bottoms of such racks to prevent the material from slipping, and it has been found far safer to set all plates at all times inside the uprights of these racks in preference to the sometimes short but costly practice of storing them on the outside of the standards, causing them to slip and fall. This practice has caused many serious accidents.

While on the question of plate racks, it is perhaps well to bring out the seriousness of the hazard caused by employes going into these racks to handle plates stored. Such practice should be prohibited under the sternest measures, as an accident resulting from one of the plates stored in the racks toppling over invariably results in the death of the unfortunate employe. Material stored in these racks can be more efficiently and safely handled from the outside of them in preference to the practice of going between the uprights.

Plates when stored flat have been found to be more efficiently and safely handled if stored with a separator in the form of a thin strip of wood rather than piled directly one on top of the other, as the danger of the hooker-on injuring his hand through the plate slipping off the pry bar through insufficient purchase in conjunction with the time consumed in prying the plate to get ample clamp purchase has alone compensated for the difference in methods.

CRANES AND TRANSPORTING EQUIPMENT

Again turning to another phase of the plant as a whole, there is perhaps nothing more important and frequently more carelessly handled than the various types of cranes and other transporting equipment operated throughout the shipyard in general.

From locomotive and other ground cranes to the shipway hoists the various hazards in conjunction with each

are invariably present, and their elimination is the combined effort of the mechanical and human phase of safety.

To the locomotive and gantry cranes the strictest rules should apply as to the riding on this equipment by employes in general. This particularly applies to the locomotive cranes, from which numerous serious and fatal accidents have occurred through employes being caught by the swing of the crane between the boiler and truck frames. Several efficient guards have been devised to eliminate to a large degree this hazard, but perhaps the surest way is the absolute forbiddance of the practice of riding the crane under any consideration and holding the leader of the crew responsible for an infraction of the order.

In conjunction with all cranes, particularly overhead, gantry and portable type, the question of warning signals is most important. Frequently the automatic and continuous operating bell signal is used in preference to the hand or foot operated signal. Experience has shown that this type of warning signal does not prove as efficient as one operated through the aid of the craneman, and its continuous sounding has a tendency to destroy its function in conjunction with the important fact of relieving the crane operator of a definite responsibility that is part of his job.

It should also be remembered that no crane can be safely and efficiently operated when there is not definite understanding as to signals used and by whom they are to be used. This point brings out the important fact of having standard signals and being assured that they are used and understood through the frequent drilling of crane operators and crane crews in their use.

Further, there is a practice prevailing in many shipbuilding plants permitting anyone to use or signal a crane. This particularly applies to shipway cranes and has proven a most costly one in many instances. To eliminate the serious accidents that occur through inexperienced men handling cranes promiscuously it has been found safer and more efficient to designate one or two trades to be responsible for the moving of material through cranes, these trades generally being the erectors and riggers, men most naturally qualified to see that loads are safely hooked up before hoisting.

In some plants these men carry markers in the form of large, bright colored buttons which are plainly visible to the crane operator working at a considerable height when on the shipways and who, through orders, will not move a load unless directed to by one, and only one, of these men at a time.

In conjunction with the operation of cranes should also be considered the crane equipment in general, particularly slings and cables.

SLINGS AND CABLES

Tradition has seemed to rule that chains should compose the material for the general sling used in a shipyard, regardless of the fast growing belief that the more reliable cable sling is slowly but surely coming into its own.

It seems that the greatest difference of opinions against the steel wire cable sling for general purposes in ship construction is that it cannot withstand the severe abrasive action of sharp corners on plates and its tendency to twist making it hard to handle. The former of these points has been greatly offset through the introduction of wire cable slings of steel possessing exceptional hardness in the quality of the individual strands making up the unit, while as to the latter the matter of twists and kinks can be largely overcome in the hands of skilled iron workers.

These objections are still further greatly offset by the large guarantee of safety that is not found through the use of a chain with the ever present uncertainty of the weld, in conjunction with the greater chance of rupture without warning due to fatigue of the metal in the chain which is not ascertained until after the accident has occurred and, in the opinion of the best

authorities, cannot be relieved through annealing.

The use of manila rope sling for hoisting material should, under the most favorable conditions, be reduced to a minimum and, better yet, be entirely eliminated.

Wherever slings for hoisting purposes are used there should be regular inspections and all chain slings should be annealed at least twice a year. The work of inspecting sling equipment should also be applied to hoisting cables and all mechanical equipment of the cranes. This work should be in the hands of competent inspectors and a close follow or check system on recommendations submitted carried out.

The efficient method of cable, sling and crane mechanical inspection work will repay for itself many times through the assurance of eliminating serious accidents due to failure of some part of the hoisting apparatus or equipment that invariably proves costly either from the point of human life or property damage.

While on this matter of handling material through the aid of cranes, it is perhaps worth while to consider another phase and important accessory to the plant, that being the railroad equipment.

PLANT RAILROAD EQUIPMENT

Frequently the safety appliances of this equipment are figured secondary to the ability of the car to sustain a load long enough to have it transported from one point of the plant to the other. A practice of this kind, which is governed largely by the factor of "It's good enough to haul the material where we want it, so why worry about details of brakes, car steps and hand grips," has many times proven an expensive economy.

The plant railroad equipment should receive the same consideration, relative to brakes and other safety devices affecting its operating, as cars on the main line of a railroad. Here, again, the matter of efficient inspection work covering the car in general has proven an economic feature, not only from the point of safety but maintenance, for through it you are constantly detecting the small defects which, if neglected, invariably lead to accidents costing large sums of money.

It has also been found that systematic inspection tends to greatly reduce damages to cars from careless loading, a practice that, unless carefully watched and offenders sternly handled, will cause many serious accidents.

The work of poorly loaded cars falls usually within two classes: First, material being placed on cars not adapted to it; and second, material piled on cars with little or no consideration for members of the train crew having to handle the cars. In the first instance plates, channels and other lengthy pieces are piled in gondolas, and in the matter of plates without braces while with channels or frames they are often thrown across the tops of the gondola body to reach their destination as best they can, where if a little forethought on the part of the parties handling the material was used it would never have been loaded on this type of car, but set on a flat car properly staked and, where it was of excessive length, provided with an idler to take up the dangers of the overhang while en route through the plant.

It is perhaps gratifying to report that the all-important phase of plant railroad transportation has within the last few years received the consideration of State industrial commissions in many instances and is governed by sets of rules or standards that have relieved a long-felt need toward eliminating the many serious hazards involved through this department of the industry.

CONSTRUCTION SIDE

Turning from the general hazards of the various shops and plant as a whole, it is no more than fitting that we touch upon the construction side of the industry, for it is here, accident statistics have proven, lies the greatest severity and frequency, and,

in many instances, the rates of this one phase of the industry alone constitute 95% of all accidents in the plant.

In weighing the importance of safety in the construction end of the work, it has been found that the lost-time accidents listed are caused largely through three sources: Material falling from staging or other sections of the hulls under construction, material dropped in handling, and falls due to defective staging and ladders and unprotected deck openings. The severity rate of this latter classification is, by far, the highest in the industry and is one that gives the safety department the most concern throughout the development of the hull from the laying of the keel to her acceptance after trial trip.

Various methods have been tried in an effort to relieve the first mentioned hazard, that of falling material, but none has proven as efficient as the combination of safety education along the lines of the dangers involved through carelessness on the part of workmen leaving the staging or other sections of the hulls cluttered up with material in such a way that it will fall, injuring the man below, in conjunction with the co-operation of hull cleaners picking up all loose material on staging or other parts of the hull where it might endanger other employes through falling.

The cause of dropping material in handling is one that can largely be taken care of through efficient educational means, as it is one that affects solely the human element of the job.

Under the classification of falls due to defective staging, ladders and deck openings, there is perhaps no part of the construction end of the industry that is better adapted to engineering revision than this particular phase.

Scaffolding in shipbuilding can be made as safe, if not safer, than that used in the average building construction through the adoption of standard methods set to the design of the ship under construction. Such standards should not only apply to the staging but to the ladders and all work coming under the direction of the stage builders on the hulls.

These standards should definitely set down the minimum number of planks to be used on working platforms, the size and construction of guard rails, the placing of ladders relative to staging, the protection of hatches, tanks and decks. These conditions should not be controlled verbally, but through definite plans worked out in co-operation with the department charged with the construction of this part of the job, set up in blue print or other form with specification attached so that everyone interested has a definite standard to work to and there is no misunderstanding and haphazard construction along this all-important line affecting each hull differently.

The development of such standards can be worked up invariably long before the keel is laid through conferences carried on over the blue prints covering the construction of the hull to be built.

In conjunction with the development of such construction standards should go a systematic inspection of each hull under construction with detail reports of the condition found submitted to the men in charge of the work for their immediate attention, and it has been found that this practice when followed will tend greatly to eliminate one of the severest accident classifications in shipbuilding.

EYE INJURIES

There is perhaps one other item that bears considerable importance to the accident cost and that is the matter of eye injuries. The frequency and severity of these injuries can be greatly reduced through the use of an efficient type of goggle. This goggle should be one that will eliminate to the greatest degree the tendency to cloud, which can be brought about largely through ample ventilation, which is of primary purpose in the case of men engaged in trades involving eye hazards working in tanks or other close quarters.

Last, but not least, under the material or plant side of the work should

be considered the use of safe tools, and this danger can largely be decreased through close co-operation with the various toolrooms of the plant, in which the men handing out tools can be instructed to distribute nothing but tools that will insure the maximum safety to the men using them every day.

HOW TO ACCOMPLISH RESULTS

The material side of accident prevention in shipbuilding has been generally touched on as detailed above, but the real results can only be accomplished through the efforts of efficient safety organization work, in which all phases of it, from the development of safety committees to the constant education of employes in safe methods of doing the job through meetings and bulletin boards, is carried on. This, in conjunction with eliminating the questionable factor in men, methods and materials, has brought the shipbuilding industry to a point in the accident prevention field where its serious hazards are fast being eliminated or reduced to a minimum, a point that is not only humane but most economical from the operating phase of the industry as a whole.

Wooden Machine Guards

By Frederick S. Benedict

ANY person familiar with the safeguarding of machinery in manufacturing establishments for a period of any length of time has noted that almost always the first effort made in this direction is with the erection of wooden guards.

THE APPEAL OF "CHEAPNESS"

Primarily there can be but one reason for this, and that is that wood presents itself as the cheapest form of material to use, coupled with the fact that there is a carpenter in every plant, whose work in doing odd jobs of most every kind has best fitted him to take up this work.

Occasionally there is some indication that some effort has been made to ascertain just what the insurance or State standards for such guards might be. But it is very apparent that no exhaustive study has been made of the subject and no particular supervision taken in the erection of the guards.

THOUSANDS OF WOODEN OVERHEAD BELT GUARDS

Overhead belts, which appear in many plants to have been the first thing to receive the attention of visiting inspectors, are for the most part guarded underneath with wood. This type of guard usually consists of two or more widths of 1-in. boards extending from the center of one pulley to the other, held up by supporting arms that extend down from the ceiling.

How many thousand of such guards there are in use would be hard to enumerate, but their number is legion. Some are very elaborate in construction, and occasionally a coat of paint is added to lend enhancement to their appearance.

"GUARDS" THAT HAVE LITTLE VALUE

Just what purpose the builders of such guards had in mind they would serve, should the belt break, is beyond comprehension. Yet, as so many such guards are to be seen, it is apparent that they have met with the approval of the inspectors that recommended them.

Personally if I worked near such a guarded belt, I would recommend that the guard be taken down, as for my part I would much prefer taking my chances, should the belt break, in dodging the belt rather than in addition hope to make my escape from the accumulation of lumber that would

come hurtling through the air, should a belt that was so guarded break while I was in its vicinity.

Here and there an overhead guard that has been carried to the ceiling at the downward drive end of the belt can be found, and occasionally wings have been built on the sides, but these for the most part are only found in plants where the work has been done under the supervision of experienced safety engineers.

It must be apparent that such a wooden guard as here described has not only not met the purpose of serving as a safeguard, but has added an extra hazard.

DUST AND DISEASE GERMS

Aside from the above defects, a wooden guard of this type soon becomes an accumulator for dust and disease germs, becomes saturated with oil and serves as an extra fire hazard, and cuts off light as well.

If a properly built wooden guard for overhead belts could be built for less than a metal guard by an experienced safety engineer, which is seldom the case, nothing would be gained, as it in time would be bound to be superseded by a metal guard, because of its other objectionable features.

UNSANITARY AND FIRE-HAZARDOUS

As gears seem to be the next thing receiving the attention of inspectors, here, too, the handiwork of the plant carpenter is very much in evidence. For small gears solid guards are usually built, and where possible they are built to the floor, so as to furnish support.

Efforts in this direction consist of a panel covering the face of the gears. Occasionally wings are added, and many times a top and back panel are included. These guards can be made without much trouble so as to comply with the standards for such guards.

Being in close contact with the machines, they soon become saturated with oil and, after being torn apart several times by the machinists in making repairs, soon reach the stage where they have to be replaced.

Aside from the usual objectionable features of a wooden guard, such as cutting off light, being unsanitary and an extra fire hazard, the danger of injury from splinters arises and furthermore in this case they cut off all view of the gears, with the result that should a slight break occur it would not be noticed until considerable damage had been done.

DO NOT MEET STANDARDS

In guarding belts, the wooden guard appears seldom to have been carried to a greater height than 42 in., especially if the guard is built from the floor. As in such cases they are usually within the 15-in. limit, they do not meet with either the State or insurance standards.

Almost always solidly built, the guards have to be torn apart to make repairs, and, because of their height, they furnish a ready catch-all for anything the workmen see fit to throw behind them. Because of the impossibility of cleaning this space behind the guards, they soon become a grave source of danger in any factory.

Most any type of wooden guard, granting the carpenter erecting it has built it to standard, is, at its best, a very clumsy affair, must necessarily take up much needed floor space and at the same time interfere with the operation of the machine.

FLUES FOR FLAMES

Another place where wooden guards have been erected in factories that have done little else to safeguard their employes is around main drives extending up through the floors. To demonstrate the great hazard of such construction a fire is needed to be started on the floor below. Where this has been experienced, all such guards have been quickly torn out, for their construction serves as a flue to draw the flames up through the entire structure.

EDITORIAL

HISTORICAL WRECKERS

IN introducing his paper at the March meeting of the American Society of Safety Engineers, published, in the main, elsewhere in this number, Mr. Albert A. Volk (using his own term) "let imagination fly back a bit" and spoke of historical wrecking events, which he pointed out were not modern operations.

Some of the illustrations used by Mr. Volk are extremely interesting. He referred to the method employed by Joshua in leveling the walls of Jericho by a band of trumpeters with rams' horns—so successful as to lead modern scientists to believe that the ancient Hebrews knew more of the theory of sympathetic vibration than even the wireless experts of today.

Another instance was that of the master wrecker, Samson, who carried off the tower of Gaza and later upset the Temple by overthrowing two pillars—to the great destruction of the Phillistines and the despair of whatever compensation insurance companies may have then existed.

The volcano, Vesuvius, was also credited with being a vigorous destroyer of cities and the methods of the Romans with their catapults was mentioned.

Nero's burning of Rome and the destruction by the Vandals and Visigoths were also referred to by Mr. Volk, who declared that destruction is an inherent human instinct the same as building is.

These historical illustrations are worth mentioning as a comparison of ancient methods with modern ways. As, perhaps, we are too little inclined to think of the ancients and their familiar deeds in modern terms, we are indebted to Mr. Volk for having started a train of thought which may lead to engaging contemplation.

THE INCREASING FIRE HAZARD OF DWELLINGS

IN an article in *Fire Protection*, W. C. Robinson calls attention to the decreasing fire resistance of dwelling construction.

This is, of course, due to the fact that labor costs formerly stabilized in proportion to average incomes, more particularly middle-class incomes (small tradesmen, fixed incomes, salaries), have been artificially increased, output considered, to about 400 per cent of the 1913 figures and costs of material in the building line (largely due to labor cost) about 250 per cent, while the incomes referred to have changed very little, in the main, perhaps not at all. So the house quoted by Wharton Clay, in his testimony before a Congressional Committee, at $4,000 average could hardly be constructed today, of like quality, for less than $12,000.

Shelter is a necessity. Therefore we must build houses and likewise we must pay for them. Nobody *wants* inferior construction, but when it comes to a choice between any kind of a house and a tent in winter the house will win about as easily as the tent would over no shelter at all; therefore, lighter framing and simpler plans prevail, which means, as regards interior plans, more continuous stairways, and superimposed partitions. Metal lath, for instance, is desirable, but metal lath at 35 cents per square yard for the lath alone is a financial impossibility in most cases.

With rental or investment construction

the situation is even worse. Interest has advanced 50 per cent, taxes, in most localities, 100 per cent to 200 per cent, cost of repairs, partly because of wear and tear of lighter construction, may be 300 per cent, while the land increment, formerly depended upon to help out the investment, has been largely abolished by the automobile. So that a dwelling built for rental purposes that could have been capitalized at 8 per cent of cost must today yield over 15 per cent of the increased cost, which practically amounts to prohibition of single dwellings for rental purposes, unless exceptionally flimsy construction be resorted to.

Discouragement of shingle roofs may serve to mitigate the fire hazard a little and special protection, which can be made at very little cost, of more vulnerable points have also some effect. Lighter built houses are harder to heat and tend to "overheated apparatus" in cold weather. But cost under present conditions must take precedence over quality, since it is more generally "Hobson's choice."

There is very little to justify optimism as regards future fire losses in dwellings or safety to life in them, two conditions being required for any real improvement, viz.: An adequate supply of houses instead of a shortage, so that the rate of new construction will be normal and costs once more stabilized and adjusted to average incomes. Neither of these conditions is in sight. Yet since the usual estimate is that no one should pay rent (interest, depreciation, etc., are to be considered as rental) to an amount exceeding 25 per cent. of his annual income and the average income is less than $2,000, there is only one conclusion to be reached. A $2,000 man may live in a $4,000 house, but he may not live in a $12,000 house without facing disaster.

A TEST OF "PAINTLIGHT"

To the Editor of SAFETY ENGINEERING:

SIR: We are being regaled with articles in the scientific journals (and some not so scientific) describing a marvelous luminous paint said to have been invented by one Giulio Ulivi of Italy.

Should the claims made for this invention be even approximately demonstrated as true, and the cost not prove to be prohibitive, fire protectionists will doubtless welcome the new luminosity enthusiastically as a practical means of destroying all excuse for searching with lighted matches in closets or leaving lighted kerosene lamps in dark hallways and at stair heads. It should also afford a perfectly safe means of lighting rooms where especially hazardous processes are conducted.

However, one can speak more positively after he has ridden in one of the railway coaches said to have been contracted for by the Italian Government—and has read his latest copy of SAFETY ENGINEERING by "paintlight."

LUMINOSITY.

Pictorial Demonstrations of Methods Used In Structural Demolition

By Albert A. Volk

President of the Albert A. Volk Company, Inc.

Proceedings of the American Society of Safety Engineers

WITH the advent of steam and steel in tall, heavy buildings, wrecking assumed an importance calling for the attention of the engineer.

I will speak of certain dangers inherent in wrecking work which do not have to do with the actual wrecking operation. These dangers are generally structural. For instance, wooden beams which have lain on walls, particularly on the lower floors, for 50 or 75 years, are apt to be rotted on the ends, and when excessive loads are imposed upon them they are apt to give way and carry down with them the debris and the men on top of that.

The seriousness of this danger is due to the fact that it is very difficult to ascertain, on account of the beams being covered top and bottom, how weak they really are. Also a great danger are warped brick walls which are out of plumb because of faulty foundations or by reason of the mortar having been poorly made and having decayed.

ARCHITECTURAL PECULIARITIES

Another source of danger lies in some architects' peculiarities and eccentricities of design. They go in for heavy, overhanging cornices, which extend out almost beyond their center of gravity over the sidewalk and are held down by weights. The cornice may stay intact for some time while not disturbed, although in cases of terra-cotta cornices, chunks are known to have fallen out, due to the freezing and thawing of the material. When the wrecker comes to the stones, unable to ascertain exactly how much of that goes into the wall of the building, a great danger persents itself.

Precautions are taken by putting up studs or beams to counterbalance the outer end, but the danger is always present, and I will show a slide later where a heavy terra-cotta block erected on a prominent street in the city fell down, due to this peculiarity of architectural design. The architect sometimes designs delicate members for ornamentation, which are always a source of danger.

Other difficulties arise when building contractors fake their jobs and do not place into the building that honest workmanship which safety calls for. Instances of that are where rivets are not driven, and in order to hide their absence the head of the rivet is placed into the hole made for it and the little wedge of steel or weight driven in so that the inspector may not notice the absence of the rivet head. This is not imaginative. This was an actual condition which we came across.

Another instance of slackness on the part of the contractor—when walls are faced up with stones, the men sometimes in their haste neglect to put the anchors which are to hold these stones in the brickwork. In older buildings of that type, where the inspection was not so careful as it is today, the mortar disintegrated in the brickwork, and when the weather expanded and contracted the masonry, the stones severed themselves from the brickwork. When the wrecker begins his operation on such piers, the danger presents itself.

Complaints are made of the wreckers dropping piers. If the pier is properly dropped, in my opinion it is a safer and better method than taking it down piecemeal. A pier is very often 8 or 10 feet high and hard for a man to get at. There is a danger to the man if he works with his bar to loosen piece by piece on the top of the pier. There is also danger to the public, because a

brick may fall outwardly and land on the shed where a man may be at work or land on the street. If the pier is of soft lime mortar and the beams are not very weak where it is going to fall, and if the wrecker takes the precaution to put a sort of break where the pier is going to fall—I mean a heavy log, or a piece of iron beam, pointing at the pier—and also takes the precaution to hammer that pier so that the bond is loose, so that the falling pier is a mass of single bricks—it is quicker, cheaper and safer.

This I have learned in my 15 years' experience. Another great danger to wreckers—an instance of which came up recently where a serious collapse occurred—is encountered where a stair-well or header has been built or a stair has been taken out of its well and the place has been closed up by means of nailing short pieces of joists on either end to the sides of the header, simply filling up the openings, but not with the intention of making it strong enough to carry any weights that might happen to be imposed on it. When headers like that occur, and a quantity of bricks is left around on the floor and a rainstorm softens up the timber and adds to the weight, great danger results. Most collapses that I know of have occurred through these hidden headers giving way.

On 52nd street and Broadway, where a building collapsed recently, I had occasion to examine what still remained of the building. I found a deplorable condition. It was criminal. Numbers of headers, numbers of stair-wells had been closed up; hangers had been put in to hold new crossbeams, and where 4 nails were required in the hanger to steady it, one nail was placed. That was a saving of nails. The people who wrecked the building were not wreckers. They overloaded the floors, or rather, they undermined the floors to such an extent that their own weight collapsed it.

DANGERS OF THE FIRE JOB

Another source of danger to the wrecker is what we call the fire job. In testifying before the Lockwood Committee, I said to Mr. Untermyer, "This was a fire job," and he said "What kind of a job is a fire job?" I hastened to explain to him that a fire job did not mean setting a fire, but clearing up a fire wreck.

The fire job is full of dangers because there is no knowing what strength is in any of the members left. I will show some slides of a fire job that will illustrate more graphically.

Another great source of danger and casualties in wrecking is when the men have to work in tiers on various floors in steel frame buildings. The tiers are put up by men working on the various levels as they go up. In wrecking the building, the order is reversed, but the wrecking is accomplished exactly as the building is put up, if it is properly done. The men working in tiers with things dropping, the haste and the speed, are the causes of most accidents in all construction and demolition. Speed and haste are the greatest causes of accidents. As an illustration of that, in a 22-story building, the Gillinder Building, which we wrecked in 45 calendar days—a very fast piece of work—83 casualties were reported, from a death to a cut finger. Another building in the same location, a 12-story building, was wrecked in three months, and because there was no necessity for haste, only three slight accidents were reported.

A question often discussed in cold blood, is whether it is not cheaper to pay for the casualties than to instal suitable protection. In other words, I may figure out the table of mortality in construction or in wrecking work is so much from my experience. I will set aside so much money to pay for my casualties and I will eliminate protection because the cost of protecting the man and the public runs up quite high.

I am not saying now that I hold the view that it is cheaper to pay for the casualties than to put up the protections. We all endeavor to do our work safely, but I think you will find that the question of safety is not so important in men's minds as the question of financial gain, even in the putting up of protections. I will confess that the protective measures which I have adopted at great expense have also been a financial gain

to us. I will not say that the financial gain was the only reason, nor will I say that the thought of the men's safety was the only reason, because, as Mr. Kuehnly has told you, nothing happened in 15 years and we all feel that there really is no danger. The men's behavior would indicate there is no danger. You have seen many a man stand on the wall and nibble the bricks out under his feet —so a man who is constantly in the midst of danger loses the value of danger soon. He does not lose the sense of danger, but danger loses its real value. So I say that if the safety engineers can use the propaganda, of bringing about a saving to the contractors and the men whom they oversee, they will accomplish their purpose quicker. I speak as an employer and as a contractor.

[Mr. Volk showed a large number of pictures on the screen and furnished an interesting running commentary on them.]

Lessons of School Fire in Norfolk

BALED waste paper in basement, inadequate fire protection, well-oiled floors and quick burning construction gave short shrift to the John Marshall School at Norfolk on the afternoon of March 21, according to a special report to SAFETY ENGINEERING. Only good fortune prevented another holocaust, as the fire started only a few minutes after school was dismissed for the day.

The fire chief did not know the location of the principal fire-main available, and stated that his requisition for suitable maps had been refused by the city manager. There were no high pressure mains and the pipes were so reduced in capacity and strength by corrosion as to render the efforts of the city fire department unavailing. Within twenty minutes after the fire was discovered the school was literally a "glowing" testimonial to the utter worthlessness of brick outside walls and slate roof as protection against fires originating within.

At fire drills several of the grades, including the kindergarten, entered into a rear court, from which they might escape by an alley—assuming always that flames were not bursting from the adjoining basement windows. It is to be hoped that cities other than Norfolk will profit by this experience, and fulfill in some degree their obligation to the little ones whose safety is entrusted to their care.

Safe Buildings in All Ways

THE Building Officials' Conference in Cleveland on April 27, 28 and 29 promises to be an important occasion. The activities and purposes of the Conference are thus described by the executive committee of the organization:

Building operations grow more complicated each year. New materials and new methods of using them are being introduced with growing frequency. New laws are being made at every sitting of the general courts. The heads of municipal building departments in passing upon methods of construction and maintenance are often called upon to decide, at short notice, questions that involve the expenditure of thousands of dollars and which affect the safety, health, and morals of the public. At such times it is of inestimable value for officials to know what the building departments in other cities have done or would do in similar cases, and what decisions the courts have sustained.

The Building Officials' Conference has been organized for the purpose of giving building officials an opportunity to meet annually for the purpose of discussing the principles and practice underlying the laws and ordinances relating to buildings, so far as concerns structural safety, fire hazard, and sanitation, and the methods of administration thereof.

The Obscure but Most Prolific Hazard

By H. Weaver Mowery

A MAN achieves success not by attempting every possibility but by accomplishing the most important things. The safety man wishing to get best results will direct his efforts to the prevention of the most serious and wasteful casualties. Therefore, a careful study of the accompanying tables will be interesting to those who are seeking for best results in accident prevention.

It will be noted, in Chart No. 1, that only "lost time" casualties are included. Such a distinction is not only desirable but vital to a common sense application of accident prevention activities. About 67 per cent of the total casualties reported to the Accident Prevention Committee of the National Electric Light Association were those causing not more than a day's lost time or none at all. The other 33 per cent, those in this table, caused the serious and wasteful casualties, designated as "lost time" accidents, each incapacitating a person for more than a day and many for weeks, months and permanently.

CHART NO. 1.—ACCIDENTS RESULTING IN LOSS OF TIME OF MORE THAN ONE DAY, BUT NOT FATAL

Cause of Accidents	No. of Accidents	Per Cent
Altercation	5	.3
Injured by animal	8	.5
Overcome by gas or heat	10	.7
Injured by door and windows	15	1.0
Explosion gas, gasoline, steam	19	1.3
Acid, solder, compounds (Burns from)	27	1.9
Machinery in motion	38	2.6
Colliding with obstruction	47	3.2
Foreign body in eye	56	3.9
Injured by nail or other sharp object	70	4.8
Wagon, auto, motorcycle or other vehicle	78	5.4
Miscellaneous	84	5.8
Electric current (shocks, burns, eye-flash)	100	6.9
Struck by falling body	153	10.5
Handling tools	155	10.7
Handling material	247	17.0
Slipping, tripping, falling	347	23.5

The "slipping, tripping and falling" class of accidents is far in the lead as the cause of wasteful casualties, and, therefore, should be the first to receive preventive consideration.

The principal cause of "falling" or "slipping, tripping and falling," etc., which is the classification used in Chart No. 2, is found to be the *slipping hazard.* Falls from temporary support (6.8 per

CHART NO. 2—FALLS

Cause of "Falling," or "Slipping, Tripping and Falling"	No. of Accidents	Per Cent
From scaffold	16	1.0
From temporary support	116	6.8
Into excavation	116	6.8
From pole	146	8.6
On stairs	199	11.7
Over obstruction	231	13.6
From ladder	231	13.6
From other elevation	246	14.5
On level	398	23.4

cent), over obstruction (13.6 per cent), from ladders and scaffolds (14.6 per cent and from other elevations (14.5 per cent) seems to constitute every conceivable kind of a fall excepting from slipping. The 35.1 per cent remaining are classified as falls on stairs and floor level; and, as tripping accidents are included in "Over Obstruction," it is safe to conclude that *at least one-third of all falls are caused by slipping on floor level and stairs.*

While "slipping" is the chief cause of the most numerous class of serious accidents, it is also the cause of a large number of serious accidents classified under entirely different headings. How many accidents often classified "handling material," "handling tools," "electric shock," "machinery," etc., are really caused by slipping is often difficult to learn, because the reports on which tabulations are based usually are not filled with a wealth of important detail. In a list of 35 serious "electric shock" casualties, reported elsewhere, four (two of which were fatal) were caused by slipping against live parts.

From the foregoing, it can be doubted no longer nor questioned that the slipping hazard is the biggest single cause of serious, wasteful casualties. It is a subtle, insidious thing, often overlooked. It is an obscure and not obtrusive hazard, unlike a whirring machine or whizzing belt. It is seldom noticed until a fall or a slip occurs; then it is usually not regarded as important and is greeted with laughter or a smile. But that it is serious, that it is the one most important point of attack, the very first consideration for preventative activity, is now obvious.

First, look for slipping hazards. Search them out. Then select a suitable, durable and effective means of eradicating them, and see that it is applied. Various anti-slip treads have been developed for the very purpose of making walking safe and are a great aid in overcoming the slipping hazards.

Granite Working Plants

ULTIMATELY a worker who daily inhales much granite dust has considerable deposited in his lungs. If he continues at his trade the lung tissue becomes harder and less elastic, he eventually finds himself short-winded, and in extreme cases death may come either directly or indirectly as a result of lung failure.

Barre, Vt., is the principal granite producing town of America. Approximately 90 plants are devoted to finishing for monumental and building purposes the stone quarried in the hills nearby, and several thousand granite workers are employed in the region. Because of the number of granite workers gathered in that section the study of their industrial disease has centered there. Recently a statistical and a medical investigation were conducted for the purpose of learning methods for prevention, better methods of treatment, and the conditions that most readily lead to disease. In connection with these it was important to have a knowledge of the dustiness of the air. The latter is also of value for comparing dust-removing devices and indicating means for their improvement. Investigation of the dustiness was made by the Bureau of Mines in co-operation with the Granite Manufacturers' Association and the Barre branch of the Granite Cutters' International Association of America.

Granite cutting with the high-power pneumatic tools in use today raises a profuse dust in the air of shops. Vacuum systems of considerable efficiency have been installed for removing the dust as it forms, but no definite information on just how effective these are has previously been secured. When the dust is scattered into the air the heavier particles quickly fall to the ground, but very fine particles remain suspended for a long time.

Safety News and Comment

Heating and Ventilation

THE semi-annual meeting of the American Society of Heating and Ventilating Engineers is to be held in Cleveland on June 14, 15 and 16. It is expected that papers will be presented, and discussions held on the methods of heating and ventilating best adapted to the health and comfort of workers in the industries.

For Safer Building Construction

COMMENTING on the recent fall of 12 tons of steel from the 10th floor of a building in course of erection in Fifth avenue, New York, Peter C. Spence, Mechanical and Civil Engineer, Department of Labor, New York State, has addressed a timely letter to the Police Commissioner of New York City. Mr. Spence says:

"Materials can be equally as well hoisted through wellholes within the building, or in a court or shaft. It must have been this thought that prompted the Legislature to enact (Chapter 31, Consolidated Laws, Section 241, subdivision 6) 'If a building in course of construction is 5 stories or more high, no material for such construction shall be hoisted or lifted on the outside of such building.'

"Ropes and chains are dangerous and defy cursory inspection. Wear on wire ropes is not only external, but also internal where it winds around sheaves. Kinks weaken wire rope. Chains break without warning, sometimes by the straightening out of a kink under strain. But the greatest danger exists in slings. Sharp corners in the material being hoisted cut the wires, and in time the rope breaks. Furthermore, the nearer the vertical lifting line approaches making a right angle with the topmost part of the sling, the more rapidly does the carrying capacity of the chain or rope become overreached. When the latter happens, the line breaks and the load falls, often with dire consequences.

"This communication is submitted in a spirit of helpful suggestion and not criticism. I know you are not in charge of building superintendence, but you do look after the public welfare. Your powers are broad, and once assured you are right, you can take steps to eliminate this danger which menaces the public. Refuse to allow hoisting over sidewalks where the building under construction is higher than 4 stories. See that licenses are not issued for such hoisting, except in cases where the work cannot be otherwise carried on. This will work no hardship on the builders. It will tend to eliminate that dangerous spectacle of mechanics riding up with the load. Without a 'gallery' the joy in this thing will be lost, and the men will go to their work in a safer manner."

A copy of this letter was forwarded to the American Society of Safety Engineers and was received by its Executive Committee which expressed itself as heartily in favor of the activities making for safety and the enforcement of the law, if such law was found by competent authority to be desirable.

Personnel Research Federation

UNDER the auspices of the National Research Council and Engineering Foundation, in the building of the National Research Council, Washington, was effected March 15 the organization of the Personnel Research Federation. This Federation includes in its membership scientific, engineering, labor, management and educational bodies. The Personnel Research Federation has been organized to bring about interchange of research information among the numerous organizations who are engaged in personnel research. It is reported to the new Federation by the Bureau of Labor Statistics, of the Department of Labor, that

there are 250 such organizations in the United States. The Personnel Research Federation will collect research information, will encourage research through individuals and organizations and will co-ordinate research activities.

Temporary officers were elected as follows: Chairman, Robert M. Yerkes, representing National Research Council. Vice-Chairman, Samuel Gompers, representing American Federation of Labor. Treasurer, Robert W. Bruere, representing Bureau of Industrial Research. Secretary, Alfred D. Flinn, representing Engineering Foundation. Acting Director, Beardsley Ruml, assistant to the president of Carnegie Corporation of New York. The aims of the new organization are: Increased efficiency of all the personnel elements of industry (employer, manager, worker) and improved safety, health, comfort and relationships.

The immediate purposes of the Personnel Research Federation will be: To learn what organizations are studying one or more problems relating to personnel and the scope of their endeavors; to determine whether these endeavors can be harmonized, duplication. minimized, neglected phases of the problems considered, and advanced work undertaken.

The Personnel Research Federation is beginning modestly and will extend its efforts as it gains in number of members and in financial support. The Federation is not another agency for research, but rather a clearing house for the existing agencies.

Fire Prevention Education

IN this year's sessions of legislatures, bills making fire prevention education compulsory in public schools have been introduced in the following named States: Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, Wyoming.

The bills based upon a law enacted a year ago by the Legislature of New Jersey, now giving excellent results, are backed by the National Association of Credit Men. The National Board of Fire Underwriters says that in view of the excessive and increasing fire waste systematic public education is a necessity. The Credit Men's campaign is the most important step ever taken in this direction.

Metal Mine Fatalities in 1919

THAT fewer men lost their lives in metal-mine accidents in this country during 1919 than in any previous year for which statistics of accidents have been compiled is shown in a report just issued by the Bureau of Mines. The number of men killed was 468, as compared with 646 killed in 1918. The number of men injured was 31,506, as compared with 42,915 injured in 1918.

The fatality rate was the lowest on record for the metal mining industry in the United States, and the injury rate was lower than any year since 1914.

The number of men employed in the metal-mining industry in 1919 was 145,262, a decrease of 27,344, or about 20% below 1918. The total working time for all employes was equivalent to 40,884,656 man-days of labor, or an average of 281 days for each employe; these figures indicate a decrease of 24.7% and 5.4%, respectively, from the record for the previous year.

For every 1,000 men employed during a full-time year of 300 working days, 3.43 men were killed and 231.18 were injured.

The metal-mining industry during 1919 was marked by unusual depression, the quantity of minerals produced, the number of persons employed, and the period of their employment all being much reduced. The number of employes at copper mines showed a decrease of 20,000; at gold mines the decrease was more than 11,000, and at iron mines

there was a decrease of about 6,000. The number of employes at lead and zinc mines in the Mississippi Valley was 1,000 below the number employed in 1918; while mines producing non-metallic minerals showed an increase of about 1,300 employes.

Chicago Safety Supervisors

THE Chicago Safety Council, on March 29, graduated 300 managers, safety supervisors, superintendents and foremen from its School for Safety Supervisors. A total of 600 were in attendance and the meeting was a decided success from every standpoint. Among the larger companies having graduates at the school were the Illinois Steel Company with 49; Imperial Brass Manufacturing Company with 12 and The Seng Company with 12. Other companies with large enrollments were: National Malleable Castings, Western Electric, Travelers Insurance, By-Products Coke, International Harvester, Chicago Tunnel, Tonk Manufacturing, Illinois Bell Telephone.

The men receiving diplomas are employed by nearly 100 different industries, railroads and public utilities. The business of the companies having men graduate ranges from department stores to steel manufacturers. The school has had an enrollment of 900 with an average attendance of 500.

Flame Safety Lamps in Coal Mines

TWO engineers of the U. S. Bureau of Mines, Mr. Ilsley and Mr. Hooker, note that several writers have called attention, in the technical press, to the possible failure of flame safety lamps in coal-dust laden atmospheres. Such writers question the safety of a flame lamp that has been proved only in atmospheres containing methane, believing that the resistance of the lamp to explosion would be lessened if coal dust constituted a part of the explosive mixture.

If this be true, it follows that any series of tests devised to prove the safety of flame lamps for use in gaseous and dusty coal mines should not only embrace tests in mixtures containing various proportions of methane, but also in some of the tests the effect of adding coal dust to the explosive gaseous mixtures should be investigated.

The official schedule (Procedure for Establishing a List of Permissible Miners' Safety Lamps. Approved, January 30, 1915,) of the U. S. Bureau of Mines did not require tests with coal dust.

Before revising this schedule it was decided to conduct tests in coal-dust laden atmospheres in order to include this requirement in the revised schedule, if the results warranted this change.

The results of tests made were very interesting from the observers' standpoint. As soon as coal dust was added, a change could be noted and some of the tests were quite spectacular.

Thirteen failures occurred from a total of 50 tests with unbonneted lamps. Two of the 13 failures were caused by the addition of coal dust. No failures occurred from 38 tests with bonneted lamps.

In summing up the test results, the Bureau of Mines engineers say that it can be stated that unbonneted lamps would be less safe in atmospheres containing coal dust provided the lamp is suddenly brought into such atmospheres when the gauze is at a bright red temperature.

Bonneted lamps are affected even less by the addition of coal dust. In extremely dusty atmospheres there might be a greater tendency towards the cracking of glasses.

Partly as the result of these tests, and partly because it would more nearly represent mining conditions, the bureau has decided that in its revised schedule for the approval of flame lamps, a certain proportion of the tests in explosive mixtures will be made with coal dust present.

The following types of lamps were used in the investigation: Davy lamp, unbonneted; Clanny lamp, single gauze, unbonneted; Clanny lamp, double gauze, bonneted; Seippel lamp, double gauze, unbonneted; Koehler lamp, double gauze, bonneted; Ackroyd & Best Lamp, Hailwood combustion tube type, bonneted.

Closing Devices for Carboys

FREQUENT fires and other accidents have occurred and still are occurring due to the breakage of, or leakage from, carboys used for the transportation of acids and other dangerous articles. The glass carboy of usual capacity, about 12 gallons, is quite fragile and even with the best available packing considerable breakage, due to improper handling, or to shocks caused by shifting and coupling of cars, or by train movement, is certain to occur. The Bureau of Explosives, speaking of closing devices for carboys and some recent experiments, says, in substance:

Until recently carboys were commonly closed by a loosely fitting earthenware stopper held more or less securely in place by clay, plaster of Paris and burlap. These closures were generally in fair condition when the carboys were loaded in the car, but in many cases jarred loose during transportation. This condition caused splashing of the acid from the carboys which, in some cases, caused fire or injury to employes, and always caused rapid deterioration of the carboy boxes, car floor and lining.

Considerable difficulty has also been caused at times by the bursting of carboys, especially those containing nitric acid, from internal pressure due to expansion of the acid by heat or by decomposition of the acid by light. Experiments showed that with tightly closed bottles of nitric acid filled to 90 per cent. and exposed to direct sunlight a pressure of 17 pounds per square inch developed in three days. These and other tests showed the necessity of venting acid carboys in order that internal pressure would be prevented. Work is also being carried on in the development of porous stoppers for commercial acids which will permit the escape of vapors produced in transit and prevent the accumulation of pressure. This work has progressed to such a point that it is believed an entirely efficient porous stopper will be available for use in the immediate future.

The closing device appears frequently to be a question of cost. If a stopper is well made of porous material and properly vented, an efficient gasket applied, a carboy without chipped neck required, and a strong metal fastening used, there will be no leakage. Improvements along this line have been marked and more are in prospect.

Acetylene Charging Plants

THERE are only two plants in Wisconsin which manufacture and compress acetylene into cylinders for use away from the premises, the Industrial Commission of the State remarks. In December, 1918, and January, 1919, serious explosions occurred in both of these plants. In the one case there was a loss of life and in the other some damage to neighboring residences. A second serious explosion occurred at one of these plants in September, 1919.

Immediately after the first two explosions, the commission says, a bill was introduced in the legislature making it unlawful to operate an acetylene plant near a city. This drastic bill was subsequently withdrawn on the understanding that the Industrial Commission would formulate a code of safety rules for acetylene charging plants. This matter was handled by the commission in the same manner as all its other safety codes. An advisory committee was organized, which was constituted as follows: Julius Heil, Heil Company, Milwaukee, Chairman. S. J. Williams, Secretary, National Safety Council, Chicago. P. H. Estes, U. S. Bureau of Explosives, Chicago. Prof. O. L. Kowalke, College of Engineering, U. W., Madison. W. J. Fairbairn, Metal Trades & Founders Association, Milwaukee. Frank H. Ode, Milwaukee, representing Wisconsin Federation of Labor, Milwaukee (succeeded by M. M. Krieps, Superior). J. R. Sullivan, Wisconsin Inspection Bureau, Milwaukee. M. A. Edgar, Industrial Commission, Secretary of the Committee.

It is stated in the annual report of the Industrial Commission that this committee held numerous meetings, at many of which there were in attendance representatives of acetylene charging plants from all parts of the country. In September, 1919, the committee submitted

to the commission a tentative draft of proposed orders on the manufacture and compression of acetylene into cylinders for use away from the premises. The commission conducted a public hearing on the proposed orders in the city of Milwaukee on October 1, 1919. Being satisfied from this public hearing that the orders proposed were reasonable, the commission adopted the same without material modification, and they became effective December 10, 1919. This is the first code for acetylene charging plants which has been adopted anywhere in the United States.

These proposed orders contain provisions regarding the layout and method of construction of acetylene charging plants and their manner of operation. They also provide that no acetylene charging plant may hereafter be built unless its location and layout has been previously approved by the Industrial Commission.

Cant Hook for Concrete Poles

THE ordinary cant hook used for wooden poles is decidedly unhandy on concrete ones. The single prong often chips out a large piece and has occasionally caused the ruin of a new pole.

To obviate this disadvantage, a new type of hook with a special foot has been invented by Mr. Jennyjohn, of the Rochester Gas & Electric Corporation. It has 4 teeth set into the face plate. By increasing the points of contact and extending the strain on the concrete over a distance of about 6 inches, it is said that this device will handle even the softest "green" pole without damage and without the risk of dropping the concrete unexpectedly.

Standard Safety Codes

AN important part of the work of the American Engineering Standards Committee relates to safety codes. Sponsorships have been arranged for the following projects:

Safety Codes—"Aviation Safety Code," "Construction Work," "Electrical Fire Code," "Floor Openings, Railings, Toe Boards," "Foundries," "Gas Safety Code," "Grinding Wheels," "Head and Eye Protection," "Ladder Code," "Lighting Code," "Lightning Protection," "Logging Operations and Sawmill Machinery," "Machine Tools," "Mechanical Transmission of Power," "Paper and Pulp Mills," "Electrical Power Control," "Power Presses," "Mechanical Refrigeration," "Industrial Sanitation," "Stairways, Fire Escapes and Other Exits," "Textiles," "Ventilation," and "Woodworking Machinery."

On December 8, 1920, at a conference at which more than 100 organizations were represented, it was unanimously voted that a comprehensive program of safety codes should be undertaken, to be carried out under the auspices of the American Engineering Standards Committee to insure proper co-ordination and elimination of overlap, etc. Active work is now in progress on more than a score of such codes with hearty co-operation among the State commissions, associations of insurance companies, national engineering societies, manufacturers' and industrial associations, labor and civic organizations, and technical bureaus of the Federal Government. As is true of all work under the auspices of the American Engineering Standards Committee, such of the bodies as are interested in the particular code in question are represented in the committees responsible for the formulation of each code.

Electrical Safety Code

A THIRD edition of the National Electrical Safety Code, prepared by the Bureau of Standards, Department of Commerce, Washington, has been issued and is known as Handbook No. 3 of the Bureau of Standards.

The National Electrical Safety Code has been developed with the co-operation of representatives of all branches of the industry and the previous edition has become widely known as Circular No. 54. This Code consists of four main parts dealing respectively with:

1. The installation and maintenance of electrical supply stations and sub-stations.

2. The installation and maintenance of overhead and underground supply and signal lines.

3. The installation and maintenance of utilization equipment.

4. Rules for the operation of equipment and lines.

Supplementary sections include rules for protective grounding of equipment and circuits.

These rules have been adopted in whole or in part by a number of State commissions and they constitute a recognized standard for the prevention of accidents in the electrical industry.

The greatest changes made in the third edition of the code are in Part 2. The loading specification, upon which are based the requirements for strength of construction, has been simplified, and has been applied to signal lines crossing railways, for which arbitrary rules were formerly used. The rules have been rearranged in more convenient order, and an index has been added which greatly facilitates the location of rules on any given item. The sag tables have been extended to cover iron and steel conductors.

The new edition of these rules is in pocket size and has been entirely separated from the discussion of the rules which accompanied them in the second edition. This discussion has been considerably amplified and will be published separately as Handbook No. 4, which is now in press. This handbook will be valuable in interpreting the rules and in making their intent and their justification more plain to the reader. The discussion constitutes a companion volume to the code itself, which should be secured by all those who have occasion to use the rules.

Copies of Handbook No. 3 may be secured from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 40 cents per copy, bound in buckram. Remittances should be made by cash or money order.

"Tisco" Sole Distributors in Cleveland

THE Pulmosan Safety Equipment Company has appointed the Imperial Safety Supplies Company of 1316 Ontario street, Cleveland, sole distributors for the Pulmosan safety devices in that territory, including their respirators, sand blast helmets and the other forms of head protectors for which they are noted.

(*Continued from page* 149)

the plants control, to a large extent, the cause and frequency of dust explosions and fires.

Mr. David J. Price, engineer in charge of the bureau's grain dust explosion inquiries, does not think much of the theory that dust explosions occur spontaneously.

"In a careful study of reports of investigations following fires or explosions the cause 'spontaneous combustion' has been assigned in a large number of cases. By careful perusal of the reports it would appear that in many cases when an unusual amount of difficulty was experienced in determining the causes and when the investigator was in doubt, 'spontaneous combustion,' a matter that many people apparently knew very little about, was a good cause to assign in the absence of something more definite. It usually meant that the cause was so obscure that it could not be established.

"It has been found that it is not possible for a dust explosion to originate 'spontaneously.' There must be some external or outside source of spark or flame, and this source must have a temperature equal to the ignition temperature of the dust. In other words, conditions for dust ignition are somewhat similar to gas ignition—a dust explosion and a gas explosion act and behave identically, with the exception that in the gas explosion the rate of flame travel may be more rapid.

STATIC ELECTRICITY

"The source of heat and flame necessary to originate a dust explosion need not be as large as an open flame, torch, etc., for it has been determined that electric sparks will ignite inflammable dusts and cause very violent explosions. One of the most prominent causes presenting itself, in very recent investigations, is the production of static electricity by the operation of machinery and mechanical equipment. The large number of smut dust explosions and fires in the grain threshing machines in the Pacific northwest have definitely indicated the relation of sparks of static electricity to the cause of dust explosions."

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

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Regular Meetings—Fourth Friday of each month at 8 P. M.

PROCEEDINGS OF THE MARCH MEETING

THE regular monthly meeting of the Society was held on Friday evening, March 25. Subject, "Safety in Structural Demolition." This subject being one of unusual interest a large number was in attendance.

The demolition of buildings, especially of the wall-bearing iron and the skeleton types, presents to the engineering world an interesting study. Much difference of opinion has been expressed by architects and engineers as to the life of our more modern buildings and it is only when they are demolished that the truth or fallacy of various theories can be established.

The first paper of the evening, by Frederick C. Kuehnle, Chief Inspector of Buildings in Manhattan, presented the Building Department's viewpoint towards safety in demolition. Mr. Kuehnle said that the rules of his department are few and simple and that his men are, therefore, most insistent that the rules of the department shall be obeyed to the full letter of the law. A substantial sidewalk bridge was always insisted upon and the faulty practice of overloading floors with debris was very closely watched by his men.

Mr. Kuehnle refrained from going into the technical details of the various safety methods practiced in demolition work as he felt that Mr. Welch, who was to follow him, had very thoroughly covered these points in his paper, "Methods and Precautions Necessary in Steel Frame and Wall Bearing Building Wrecking."

The paper by W. E. Welch, Senior Contract Inspector, Travelers Insurance Company, covered in a comprehensive way the safety methods used in connection with the razing of buildings. Mr. Welch described the sidewalk bridge, its size, its character and purpose and gave the details of its construction; he described also the material chute, the out-riggers scaffold and the type of derrick and rigging necessary to proper and safe demolition operations.

Mr. Albert A. Volk, president of the Albert A. Volk Company, Inc., gave by lantern slides "Pictorial Demonstrations of Methods Used in Structural Demolition." Mr. Volk presented his subject as an imaginative historical review of demolition work from the days of the early Romans down to the present era. His pictures featured the demolition by time of the Coliseum of ancient Rome; the demolition or destruction of Rome by Nero with fire, the demolition of some of New York's smaller and older buildings down to some of the recent demolitions of New York's most modern structures.

Some of the pictures illustrated quite clearly the scaffolds and methods previously described by Mr. Welch in his paper.

Mr. Volk criticized some of the

prominent architects for what he termed the eccentricity of their designs, not because of faulty detail of design but because of the hardship imposed upon the demolition contractor in the taking down of their edifices. He mentioned in particular the heavy lintels and cornices of some of Stanford White's work.

"Statistics of Accidents in Building Demolition" was the title of a paper by Peter C. Spence, New York State Labor Board, which showed favorable progress on the side of safety in modern demolition.

Mr. Hugh Frayne, General Organizer, American Federation of Labor, spoke on "Safety in Industry." While not confining himself strictly to safety in demolition he presented in an interesting and appealing way the necessity for immediate improvement in the safeguarding of the lives of women and children, now daily exposed to street accident hazards, poor food and lack of intelligent and proper care.

The length of the program and the lateness of the hour prevented much if any real discussion on the subjects of the evening. The President, Mr. Sanford, called for an adjournment of the meeting at about 11:30, which was seconded by Mr. Welch.

FREDERICK P. PORTER,
Member Publications Committee.

ANNOUNCEMENTS

THE April meeting of the American Society of Safety Engineers will be devoted to "The Work of the Underwriters Laboratories." The speakers are to be Mr. Dana Pierce, Vice-President, Underwriters Laboratories, and George B. Muldauer, Liaison Representative of the same organization.

It has been decided to hold the annual outing of the Society at Bear Mountain, Palisades Interstate Park, on June 24. Further information later.

The president announced with regret that Dr. Miller Reese Hutchison had resigned from the Chairmanship of the Standing Committee on Public Relations of the Society, as important business in which he is engaged would prevent him from doing any work for the Society at the present time.

An effort is to be made to have fewer papers at future meetings of the society and more discussions. This suggestion by President Sanford is generally approved by the membership.

POSITION WANTED

Married man wishes position as Safety Engineer. Has had twelve years' experience in stevedore work, lighters, barges, scows, tugboats, etc., and desires position of similar nature. Best references furnished. Address A. S. S. E., No. 8, SAFETY ENGINEERING, 80 Maiden Lane, New York City.

Red Cross First-Aid Course

CHAPTERS of this department of Red Cross work are being organized at various centers. The Red Cross announcement:

First Aid is valuable from an economic standpoint; where an industrial plant has safeguards, a safety organization, First Aid materials and trained First Aid attendants, the compensation insurance (liability) rate has been lowered 12 per cent. First Aid shortens the time of recovery by preventing infection and loss of blood. In addition, deformity is often prevented and lives are saved, thus lowering the amount of compensation to be paid out.

A number of detachments have been organized in connection with large plants, of both men and women who are trained, in addition, in home nursing, sanitation and hygiene. They are also drilled so that volunteers are immediately available for an emergency in the plant or in the community.

Safety Fables in Slang

By E. S. Edwards

ONCE upon a time there was a GUY in our MILL with a CASE HARDENED System who was IMMUNE from everything.

He never was on the SICK list. He could MIX in with all kinds of beautiful diseases like SMALL POX and YELLOW FEVER without missing a day's work. He could fairly EAT POISON IVY and stroll through SUMACH and other poisonous things without turning a hair.

As a KID he made a specialty of romping gleefully over CUT GLASS AND BROKEN STONES in his bare feet and DARED anyone to follow him. As a man he could fall off a house top without a RUFFLE and come up with his LID on straight. To all intents and purposes he was a REAL LIVE HUSKY. CAUTION SIGNS meant nothing to him. They were for WEAKLINGS AND TENDERFEET.

If he had the REACH along with his other PERSONAL SPECIFICATIONS, Jack Dempsey's crown would be his and STRANGLER LEWIS' name would be but a FADED MEMORY.

But one fine day our LUSTY FRIEND scratched the bark off one of his haymakers. It was a NAIL or a PIN or some other such thing that did the DIRTY WORK, and, although he was heard to say, "SCRATCHES AIN'T NOTHING," it was but a short time before our friend was on the FLAT of his back, AWFULLY SICK AND AWFULLY SORRY. A little microbe knocked him down for the COUNT and then fastened a HEAD LOCK AND TOE HOLD on him. He was down and out with both shoulders on the mat.

When last seen he was HOPPING around the burg with a GIMPY leg, and they say he INHALES his meals through a quill toothpick. He is lucky at that. The undertaker almost got a customer. P. S. Moral: A scratch, cut or burn calls for a HURRY UP P. D. Q. visit to the Hospital. GO TO IT: GET BUSY about yourself or a fancy named poison bug will BEAT you to it and your name will be MUD.

ONCE upon a time a Gay Gazabo who worked in a Shop took great delight in Passing Up Fire Drills and Safe Advices and Devices, gotten up for the special benefit of such Ginks as he. He had no Gray Matter under his Thatch. Yet he knew a Thing or Two.

There was no possibility of the old Dump burning up. Nobody smoked. Matches were at a Premium and Gas Jets were Minus. How could it burn; No Chance! Fire and Protective work he Passed Up as old-fashioned Stuff. All O.K. for old people at Prayer Meetings and Kids at school, but not for real live Grown-ups; Nothing Stirring.

Yet one fine day our Brave Bucko was Digging at his work when the Glim above his Bean gave out. He Hopped the bench, against aforementioned advice and started to Fix it. He knew how—he was Clever. He Shorted two wires, blooey a spark came out of the Blue and Toasted him to a Frazzle. They brushed him upon a Bread Crumb Shovel and sent his Remains home in a pill box. The fire in the room was Squelched by the rest of the Gang Wised for such Emergencies. The records do not say whether our friend's folks collected Life, Accident or Fire Insurance. Carelessness was the Charge, and the Verdict was Guilty.

Moral: Get the Fire and Safety Dope down Pat, and even pass it on to Friend Wife and the Kiddies at home, for the Rush Wagon that has just gone tearing up the street may be headed for your house next. Better Safe than Sorry, Happy than Hazardous. Don't Take a Chance.

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 459 STORY OF PAT AND THE LITTLE GERM.—Pat McGowan worked in the rubber mill over in that brick building near the side entrance. He was an old hand, cheerful, sincere, always trying to save waste.

He scratched his finger. No one knows where. Small matter. Too much bother to go way over to the factory hospital and have the nurse paint it with iodine, and not worth while going to the Red Cross box on the foreman's desk for a little dash of alcohol rubbed on it. Anyway, the alcohol was probably all drunk up!

Forget it!

Pat did just that.

In a week or so, hand began to swell. Blood poisoning. Couldn't sleep nights, the pain was awful.

Month later whole arm swelled. Probably have to cut it off.

Six months later, Pat, still at home, sidestepped the saw but arm, saved for ornamental purposes it seemed, curled up like a leaf. Hand still swelled up and looked like a hunk of wax under the bandages. Visits to doctor required all the time between to master courage for the next one.

Year gone by. Pat still at home, arm still useless, can now wiggle one finger or hand a little. Family did not starve. Compensation took care of that, luckily.

Two years have passed. Pat back at work. Not same job. Arm not yet strong. Pain, enforced idleness and worry have made Pat over. No longer agreeable and helpful, but cold, suspicious and uninterested. Both Pat and the mill lost out.

You may scratch your hand on the kitchen stove or on the padlock of the woodshed tomorrow, but if you wash the cut, paint it with iodine or soak it with antiseptic, you will not tread the painful journey traveled by Pat McGowan.

In boyhood days mother used to urge us not to notice "that little scratch," and we took pleasure in making fun of little sister who cried because of a slight cut. We know better now. We know that there is a little creature so small that it takes a powerful microscope to see him. His name is "bacillus," nickname "germ." Many millions exist in every cubic inch of about everything, including your blood. There are good ones, bad ones and indifferent ones. Fortunately, the harmless ones predominate in the human body, but when the harmful ones, through ill health, become too strong, we have some particular sickness. We get a scratch, along comes a little dust, perched on the dust is a squad of germs with long hair and funny legs. They may be mighty small, but they are there just the same, and when they land on your fresh cut they get into the blood. You get anything from a cold to lockjaw, depending on the brand of germs you have collected. Should your scratch be from the point of a pin, there is plenty of room on it for about a thousand germs to play golf and you get a few that are rubbed off when you interrupted the game. However, a little iodine or

antiseptic externally applied will kill them off and no harm done. *To prevent these minor accidents from becoming surgical cases is exactly why you are asked to visit the factory hospital and permit the factory nurse to give you first aid treatment immediately after the accident.*

A few thousand years ago, in the good old Mesozoic times, when men inhabited the earth somewhat, they lived in caves about half way up the side of a cliff and they were afraid to go out much evenings. The reason why they liked to stay home so well was mainly that a man made about one nice mouthful for a dinosaur who stood about forty feet high in his stocking feet. There were others, just a few. The pterodactyl was about as big as an elephant and he gracefully flew around looking for a few two-legged specimens for supper, right after dark usually. Others might be mentioned and all had good appetites.

Where have the good old days gone? Where have those interesting animals disappeared to? Was man mighty enough to conquer them? Not so. They were put out of business by the little germ! The little germ named Pneumonia got some. The germ named Dysentery got others. Old friend, Septic Poisoning, got quite a respectable number, etc. In short, the little fellows cleared the earth of the dinosauria and mammoths of various kinds and are now turning their attention to mankind for lack of anything better to do, so to speak. Will they finally rid the earth of the remaining animals, including man? Probably, but it will take time, fortunately.

In the future when you get a scratch think of the little germs who were big enough to lick the dinosauria and remember they are still with us. Same ones, perhaps, as young ones have been caught alive, wrapped up in Egyptian mummies known to be about 4,000 years old. Let your respect for what they can do grow. Kill them promptly or they may do that kind turn for you.

If one of your men is cut, do not tell him to spit on it and let it go at that. Think of the little lockjaw germ. Send him to the factory nurse. It will require but a few moments to paint the wound with iodine or treat it properly. Blood poisoning means much pain, grief, expense, neglect on somebody's part and loss both to the victim and to the mill.

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No. 460

PHYSICAL EXAMINATION A KEY TO SAFETY.—This is a subject that has not been discussed in print as thoroughly as its importance as a safety measure demands, in the judgment of the writer.

The first duty a human being owes to his Maker, the world and society is to be physically fit to undertake the duty devolving upon him of wresting from this old world the living that is his due; for 'tis written that "By the sweat of thy brow shall thou eat bread." Thus it was intended that man should work.

To feel and know that one is in good health fortifies him for such work as falls to his lot. The knowledge that one is well should be known to his employer also, as their interests are mutual from a production point of view. Then, there is also the humanitarian interest that it is our duty to feel.

It often happens that men assume (or are assigned to) work for which they are unfitted. Such unfit physical condition should be disclosed by physical examination. Very often some ailment is brought to light that was not even suspected. This is another important reason for physical examination, as it gives one a chance to get well or be assigned to safer work—a thing that certainly should be done.

Physical examination brings to light many ailments or deformities that weaken the human system by bringing on greater strain in the performance of assigned duty. For instance: A man with weak or defective eyesight is not a safe man to perform hazardous work that requires good sight. Would it not be a blessing to such a person to be treated, or perhaps fitted, with glasses correcting such trouble? Again, a man having a weak heart should not handle electrical apparatus where there might be danger of shock. There are many such cases that only proper examination can bring out. One may be attacked with

some form of sickness which lowers the vitality to such an extent as to render one incapable of performing his duty safely. With proper advice and treatment one would be restored to normal health quickly, but, if left untreated he might be, and I believe often is, unfitted for work for a long period. That one can work in much greater safety, if he is well, cannot be disputed. Therefore, the physical examination should be installed as a matter of greater safety, and it should be welcomed by both employe and employer. An objection sometimes raised by the worker is that examination might take away his chance of earning full wages at his chosen calling. Should his work be hazardous this excuse could not be accepted. If, on the other hand, unfitness does exist, would it not be a merciful kindness to know the truth and be put at safer work?

A man and his employer owe it to themselves and to those who are dependent upon them to make their work and the world safer, to prevent industrial accidents. Again, I say, it is their duty—and a God-given privilege.

The physical examination should be instituted and become an enforced safety measure in all institutions where labor is performed.

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No. 461 How to Get His Support.—Before discussing the subject we must keep in mind whether the executive we must reach is an executive of the Old School (usually, to use a slang expression, termed hard-boiled) or whether he is a modernized leader.

If he belongs to the first class, it is almost certain that he is slated to slide before many more strands of his hair (presuming he is not bald-headed) turn gray. This class of executives must be approached in a casual manner and must be shown, emphatically, in dollars-and-cents, that it pays to supplant carefulness for carelessness in his plant.

It is not such a difficult thing to do this when you consider that you must be so situated in his employ as to have his confidence. Without his confidence you cannot reasonably attempt to put over a safety organization on him, as he will sense overhead and believe you to be ferreting around in your own interest rather than in the interest of humanity and in the saving of avoidable overhead for his firm or corporation.

To reach him properly use tact and an allotment of ordinary common sense. Get to him immediately after lunch if possible because at that time, as a general rule, he is in a somewhat pleasanter mood, passively enjoying a black broadleaf cigar and desirous of discussing some new topic. Remember the executive of the Old School generally aims to clear up his business hang-overs in the morning—and that is a poor time to approach a burdened mind with a new subject.

When you have succeeded in getting an audience with him be armed with facts and figures ready for immediate reference. For example: Tell him that Jack Smith of the mill department lost an arm when caught between the rollers. Explain to him that it is pretty tough on Jack's wife and kiddies. Make him understand that every time an accident occurs it not only means pain and loss of time for the injured man and greater risk to the other employes, but also less efficiency in the organization and a reduction of output because a green man has to take the place of an experienced man.

Now that you have got him thinking keep up the good work and tell him that Sam Jones of the boring mill department was ruptured when a stick that he was using to shift a belt on a cone got caught in the lacing. Show him how the installation of a mechanical belt-shifter will not only prevent accidents of this nature but will also pay for itself in dollars and cents and in the good will of the operator. Explain to him that it is necessary to shift that belt about 10 times a day with a stick or other implements. Convince him that by the means of a mechanical belt-shifter the shift can be made almost instantaneously, thereby saving about 15 minutes a day or 6 hours and 30 minutes a month of 26 working days. Explain to him that this saving of time, alone, for one month of 26 working days amounts to approximately

$6.50, basing the operator's hourly rate at $1.

He is interested by this time, as you have touched him from all corners, and he will naturally want to know the cost of a mechanical belt-shifter. So show him the price quoted you for a mechanical belt-shifter, which will be about $25, and allow about 35% for overhead and installation. He is then convinced that safety not only, in many cases, pays for the cost of safe and better equipment, but also that it increases efficiency, lessens hazards and increases production.

Now you have touched the Old School executive from a humanitarian angle and also have him thinking about larger dividends. What's his answer?

"Try it out."

Always keep in mind that every safety worker, whether or not he or she is a director of safety, a safety engineer, a safety inspector, a clerk or a stenographer in a safety department must have sales ability, combined with a pleasing and convincing personality, and that a safety worker must not be a theorist, but a practical, conscientious human being.

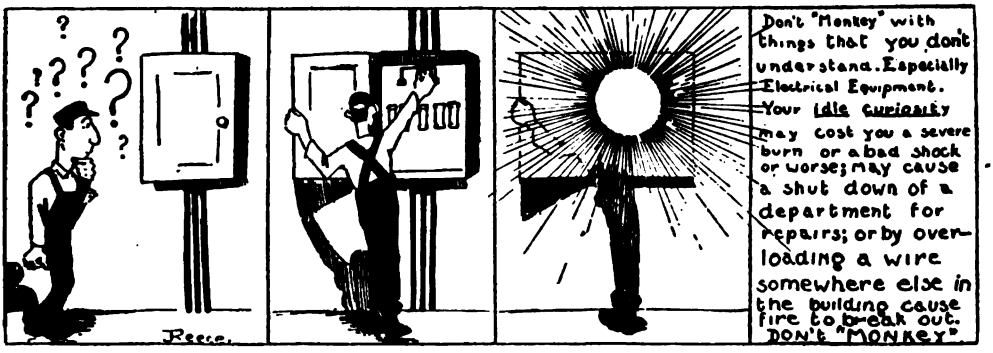
Putting your proposition over with a modernized executive is not a difficult feat. A Modernized Executive has been sold on the safety idea, and if he has not started an organization in his plant he is merely waiting for some one in his employ with initiative to approach him on the subject.

Like the Old School executive, he must be convinced. Therefore, he must be resold with the idea that *safety pays*. It is up to you to sell him. Approach him as you would the Old School executive, that is, from both angles, humanitarian and dollars-and-cents.

Never try to sell an executive of either class by trying to convince him on either humanitarian or dollars-and-cents viewpoints separately. Sell him both and you've got him. Touch on life and blood first, then on the Almighty Dollar.

Announcement of Prizes for The Man On The Job Articles Published in the March Number, and Comments by Members of the Committee, Will Appear in the May Number.

Don't Monkey With the Juice!


Don't "Monkey" with things that you don't understand. Especially Electrical Equipment. Your idle curiosity may cost you a severe burn or a bad shock or worse; may cause a shut down of a department for repairs; or by overloading a wire somewhere else in the building cause fire to break out. DON'T "MONKEY".
Reese.

Ontario Safety League (Courtesy of Procter & Gamble.)

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

WAREHOUSES, PUBLIC STORES

February 18, 1920. Boston, Mass. Brick building, 67-69 South street. Sale and storage of upper leather. One 5-story basement building damaged. Walls, brick. Floors, open mill construction. Roof, flat, tar and gravel. Cause, probably friction in belt pulley. Fire started on fourth floor. Discovered by occupants at about 10:47 a. m. Alarm, through fire alarm system. Duration, 10 minutes. Confined to the point of origin. Fire was favored by wooden partitions and unprotected open stairways. Firemen handicapped by excessive accumulations of ice and snow in streets. Private fire apparatus, none. Persons in building, 14. Killed, none. Injured, none. Means of escape, main stairway, balcony fire-escape in rear. Value of building and contents, $700,000. Property loss, approximately $7,000.

February 26, 1920. Elizabeth, N. J. Oil Refinery Plant of Swan & Cook, Inc. South Front street. Oil storage. Two 1- and 2-story buildings destroyed. Walls, wood. Floors, wood. Cause, unknown. Fire started in oil storage building. Discovered by watchman at about 11:20 p. m. Alarm, telephone and bell alarm. Duration, from 11:40 p. m. to 7:12 a. m. Stopped at oil storage plant. Fire was retarded by one fireproof building at the plant which held fire from spreading. Firemen handicapped by snow which prevented department from making quick time. Private fire apparatus at Swan & Cook Co. on one side and Galena Signal Oil Co. on the other. Persons in building, watchman. Killed, none. Injured, none. Property loss, not reported to SAFETY ENGINEERING.

February 28, 1920. Moline, Ill. Storeroom, in Lundell Building, 512 16th street. Battery supply station. One 1½-story building damaged. Walls, brick veneered. Floors, wood. Roof, wood, asphalt paper covered. Cause, defective wiring on battery motor. Fire started in rear of building. Discovered by passer. Alarm, verbal call. Duration, about one hour. Fire was favored as building was open and had wooden walls and wooden ceiling. Private fire apparatus, none. Persons in building, none. Means of escape, rear and front doors. Value of building and contents, $7,500. Property loss, $3,460.

March 3, 1920. Dallas, Tex. Brick storehouse of Baptist Memorial Sanitarium, 703 Adair street. Store room for Baptist Sanitarium. One 3-story brick damaged. Walls, brick. Floors, wood. Roof, gravel, tar and paper, shingles. Cause, unknown. Fire started, ground floor at stairway. Discovered by employe at about 1:22 a. m. Alarm, telephone. Duration, 40 minutes. Confined to upper story. Private fire apparatus, none. Persons in building, none. Means of escape, one stairway. Value of building and contents, $16,000. Total loss building and contents, $6,046.

March 30, 1920. Salmon Falls, N. H. Somersworth Foundry Company. Stove foundry storehouse. One 2½-story front, 3½-story rear and basement building damaged. Walls, stone and brick basement, wood. Floors, board and plank. Roofs, board and tar paper. Cause, unknown. Fire started, upper story north end of building. Discovered by watchman at about 5:35 p. m. Alarm, steam whistle from plant. Duration, about 5 hours. Stopped in basement and buildings abutting. Fire was favored by construction of building. Firemen handicapped by delay in starting foundry plant's fire pump (help and regular engineer gone). Fire apparatus from South Berwick, Me., fire department. Persons in building, none. Means of escape, stairways and doors. Value of building and contents, $75,000. Property loss, $50,000.

SCHOOLS AND COLLEGES

June 28, 1920. Fairfield, Me. Prescott Memorial building, Showhegan Road. School, amusement hall and bakery in basement. One 2-story and basement building destroyed. Walls, brick. Floors, steel and wood. Roof, supposed to be fireproof. Cause, unknown. Fire started, in bakery. Discovered by school boys about 4 p. m. Alarm, telephone. Duration, 3 hours. Stopped in same building. Fire retarded by construction of building. Firemen handicapped by lack of water. Private fire apparatus, hand chemicals and tank of water. Persons in building, none. Means of escape, none. Value of building and contents, $100,000. Property loss, not reported to SAFETY ENGINEERING.

Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

VERTICO-SLANT STYLE C-127

The timely feature of this model drinking fountain lies in the combination of the famous "Vertico-Slant" nozzle with a cooler of ususual excellence.

This fountain has a completely insulated body cooler, which has a galvanized outer shell with cast iron top, bottom and base. The top is constructed so that it can be locked permitting the cover to be taken off only when necessary to renew the ice.

The waste water from the drinking fountain bowl is combined into a one pipe outlet with the melted ice and it is trapped so that the air cannot pass back to the drinking head. The coil is made of ⅜" full weight galvanized wrought steel pipe containing about 92 feet. It is closely wound so that the inner walls of the cooler are thoroughly protected from damage in throwing in heavy pieces of ice while the bottom is protected by a heavy corrugated steel plate.

The self-closing faucet is ball bearing of most modern construction while the drinking head contains the famous "Vertico-Slant" nozzle which prevents the contamination by lips and the consequent spread of disease. The fountain is manufactured by the Rundle-Spence Manufacturing Company, 65 Second St., Milwaukee, Wis.

STANDARD OPTICAL POSTERS

A very impressive series of posters is being put out by the Standard Optical Company and we believe that they are prepared and will be pleased to send these posters to any one who can use them to good advantage. They are of convenient size (7x10) and drive home the necessity of wearing goggles. For instance, one of them shows a man in a dark room falling over a chair and this is accompanied by the motto "Ever bark your shins on a rocker in a dark room? How'd you like to go through life doing it?" Another one shows a picture of a man with a blind sign on his chest and an alms cup in his hands, the reading matter stating that "Every time you neglect to wear your goggles you become a candidate for a steady job holding a tin cup and wearing a 'Please Help the Blind' sign."

These posters are finished with a brass grommet at the top so that they can be hung without tearing.

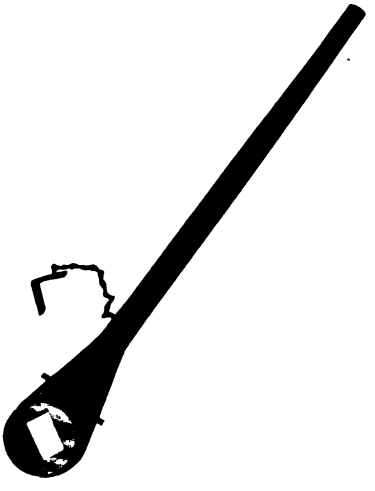
"THE OPTIMIST"

We occasionally wonder why the popular magazines are not more entertaining and suddenly discover that the talent has been somewhat transferred from the professional to the comparatively amateur field of the house organ. These house organs are usually edited by some busy official, and the *Optimist* issued by Frick & Lindsay Company of Pittsburgh is no exception to this rule. It is however an exceptionally well edited and printed publication and the brilliancy of its contents compares very favorably with the offerings of the news stands.

THE I X L SAFETY REVERSIBLE RATCHET CAR WRENCH

A very fruitful source of injuries around mines, warehouses and mills is the wrench used for the dumping of drop bottom car doors and this is because the proper sort of tool is not always used for this purpose.

The danger is so frequently unsuspected that Mr. Edwin Lee Goucher has written a most interesting and clever booklet entitled "He didn't know it was loaded—He took a chance and now ——," setting forth the advantages of using the I X L Wrench, distributed by Frick & Lindsay Company of Pittsburgh, Pa.



This wrench will dump drop bottom cars with perfect ease and safety. It is simple and strong, being made of dropped forged steel throughout. The head works on a ratchet with reversible pawl which is always in plain sight and this constitutes one of the safety features, as the operator can see that the pawl is properly adjusted before he applies it.

Aside from safety and convenience, the I X L wrench is a good investment as it saves the loss and investment of other tools and the time lost in hunting for dangerous makeshifts.

Without the I X L wrench work crews are put to the necessity of using any kind of tools they lay their hands on and they are not particular about putting them back where they belong.

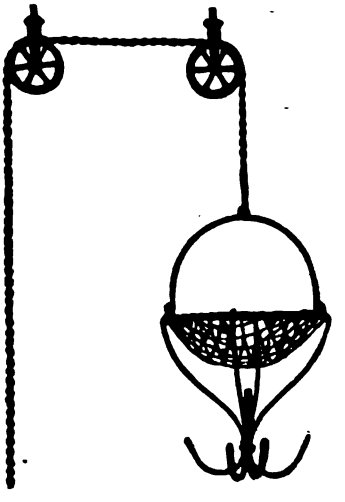
The I X L wrench weighs 19 pounds and is 34" long. It fits all standard winding taps and is adjustable to most of the odd sizes. It not only opens doors safely but closes them again conveniently with the pawl reversed. The I X L wrench is in daily use by many steel companies, coal mines and dealers, brick and clay plants, plate glass works, refineries, blast furnaces, power plants, railroads and the like. The booklet referred to is well worth sending for.

DIAMOND SANITARY CLOTHES HANGER

The Safety First Supply Company of Pittsburgh, Pa., now has on the market a splendid device known as the Diamond Sanitary Clothes Hanger. This hanger is a most efficient, economical and sanitary arrangement for caring for the employees' clothes and effects.

The unique ceiling suspension is superior to the locker in sanitation, economy of space and cost. Through its use the clothes are absolutely safe from theft and disturbance, are thoroughly aired and dry, and yet are quickly accessible to the owner.

This hanger is manufactured in their own plant and is absolutely high grade throughout. It consists of fewer pieces than any other—no loose parts to become lost—and it is one simple connected unit comprising the basket, four hangers, two ceiling pulleys, thirty-five feet of special galvanized chain and one padlock.



The basket is made of heavy galvanized wire, and is so constructed that it will hang level at all times. By the method of attaching the padlock to the basket chain, it is impossible for the basket to drop to the floor if the chain should become loosened. Further, the method of attaching the basket and locking it to the ceiling is the most simple, and yet the most effective which has ever been devised.

CLEVELAND POLICE USE LYON BREATHING MACHINE

During the past year or two the value of mechanical resuscitation has been recognized by a rapidly widening circle of influential surgeons, and prejudices which existed against this artificial method of breathing have been dispelled by a wider knowledge of the capabilities of the apparatus. A prominent physician recently said, "If one-tenth of the time which has been spent in condemning mechanical breathing devices had been devoted to learning their simple operation, thousands of men might be living who are now dead."

Large commercial organizations are now equipping every danger point with mechanical breathing machines and where these machines are not installed, it is customary to call for an ambulance equipped with one, even when the manual method of resuscitation is being employed.

Within the last few weeks a notable instance of life-saving became part of the daily work of the Cleveland Police Department, when three stories of the old Masonic Temple, which was being demolished, unexpectedly collapsed and imprisoned several in the ruins.

The story as told by a member of the "Flying Squadron" is as follows:

"The call came in at 9.27 a. m., and we immediately answered it with the full force of men together with the paraphernalia which we usually carry. On arriving at the scene of the accident we found that the three walls had collapsed, carrying with them the workmen who at that time were engaged in tearing them down. We could not tell exactly how many men were buried for some time. We, however, managed to extract two within a short period of time. These men were so injured that they were past all help.

"Upon inquiry among the remaining workmen we found that there were others still missing, and in going through the building we heard cries in the basement, which was as dark as pitch and full of smoke. After much difficulty we managed to get down close enough to determine that someone was buried beneath the debris, and in such a position that the entire weight of all the three stories seemed to be upon him. It appeared, upon closer investigation, that an I-beam had fallen across the person's body, and that the entire body of the masonry, I-beams and structural work rested on this beam, and held him in such a position that it was impossible to immediately extricate him.

"Upon the investigation of men who had charge of the work it was found that this person was a boy, sixteen years old, who, by this time, had succumbed to the smoke and shock, and when we reached him he was entirely unconscious, and so far as we knew past all earthly aid.

"We immediately placed the breathing machine upon him and operated the device. By the time sufficient workmen and firemen came to relieve us and to remove the debris from above five hours and twenty minutes had elapsed. During all this time we were operating this device, and so sure were we that the device was doing its work, that upon the suggestion of one of the individuals we removed it, and he immediately ceased breathing. We hurriedly adjusted the apparatus, and continued operations. This was done once or twice more because we were induced by some other members of the force to believe that it was necessary, but in each instance we found out that the young man immediately stopped breathing, and we continued operations as before. (The boy is now living and well.)

"The physician who was in attendance during the latter part of this accident was extremely enthusiastic in his commendation of the apparatus. He said, beyond all question of doubt, if we had not been prompt in the application when we first found this young man he would have been past all help."

The machine was the "Lyon," manufactured by the Cleveland Breathing Machine Company, and the development of its president, E. H. Lyon, who is naturally proud of, though not unaccustomed to, the performance of his machine as recorded.

NEW CONDULETS, ZY SERIES

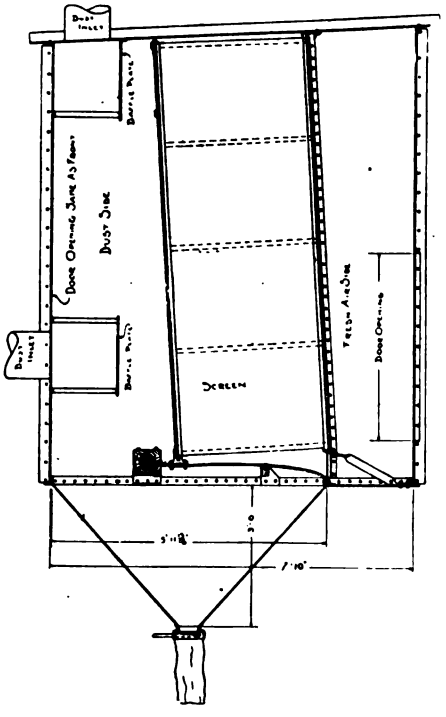
We are in receipt of a folder descriptive of ZY condulets for the control of small motors. This is illustrated with pictures of condulets type ZYU and ZYC as well as applications of these condulets and others to machine tools. The quality of the circular is in keeping with all of the matter which issues from Crouse-Hinds Company.

WILLSON GOGGLES

We have just received a new catalog of the Willson Goggles from Willson Goggles, Inc., Reading, Pa. Enclosed in this catalog is a new price list and leaflets descriptive of some of the more popular types. The catalog in question appears to be a complete reference book of the subject and copies should be sent for by goggle users.

SLY DUST ARRESTERS

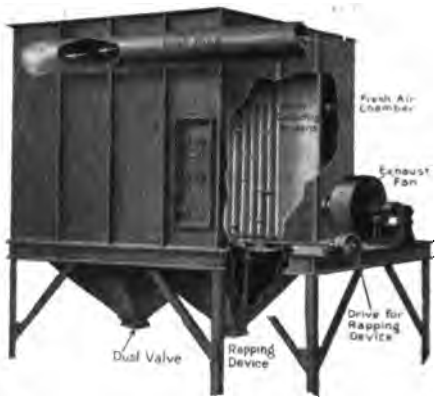
We are in receipt of a circular issued by the W. W. Sly Mfg. Company descriptive of their dust arresters which are widely used for the elimination and confinement of dust which are claimed by the manufacturers to collect 100% of the material drawn or blown into them and which claim is backed by a manufacturer's guarantee.



These arresters are used in connection with the manufacture and handling of cement, hard rubber, carbon, coffee, tar products, lime, soapstone, garbage, tobacco, iron oxide, crushed stone, chemicals, fertilizers, pearl buttons, etc., and other applications have been made in connection with sand blast installations, grinding equipment, office and factory heating and ventilation.

These dust arresters are all of a standard width of 7′ 10″; the height varies as follows: type "A" 10′, "B" 7′, and type "C" 5′ 6″, plus 3′ 6″ for depth of dust hoppers; the length varies from 3′ up, depending upon the amount of air and dust to be handled. Type "A" should be used wherever possible, while types "B" and "C" are used for installation inside of buildings with limited headroom.

The construction and appearance of these arresters are clearly shown by the sectional and perspective illustrations herewith.



An extremely large cloth filtering surface in a comparatively small space, the durable construction, simple and economical operation, and comparatively low initial cost are the prominent features of these arresters.

PULMOSAN SAND BLAST HELMET WITH A REMOVABLE FRONT SCREEN

Due to the constant demand the Pulmosan Safety Equipment Co., 45 Willoughby St., Brooklyn, N. Y., have developed a sand blast helmet with a removable front screen. This

helmet has its advantages of renewing the screen after it has been worn out, without decreasing the life of the helmet. It has a frame attached to the cloth with a series of slides whereby the main screen can be slipped in or out at will. The main screens are fitted with flanged pieces of metal to fit the slides. This helmet is made to fit all sizes of heads.

AMERICAN LA FRANCE SPECIALTIES

We have received a very attractive folder of the American La France Fire Engine Company, Elmira, N. Y., displaying in effective style many of the safety devices which they manufacture and sell. The folder is equivalent in size to a twelve-page catalog and as it represents the latest exposition of the American La France products it should be sent for by safety engineers.

MORE CONDULETS

Following their usual practice of announcing various uses of Condulets in a series of broadside folders, the Crouse-Hinds Company of Syracuse have just issued one devoted to Plug Receptacle Housings for the use of portable electrically driven tools, etc., these being known as the RJ types.

The same circular describes safety switch condulet with type MKC safety switch and also safety motor starting switch condulets featuring type MFC. Those who are keeping a complete set of these folders should be sure to obtain this new one.

"TISCO" CIRCULARS

Although the new Imperial Safety Supplies Company of Cleveland have not yet completed the comprehensive catalog which they have in preparation, they are issuing a series of circulars covering special lines which they handle and serving also to acquaint the trade with the appearance of the men back of this new and active organization.

FEDERAL ELECTRIC LANTERNS CANNOT CAUSE EXPLOSIONS

Thousands of dollars' worth of property is destroyed and many lives are lost annually by explosions because oil instead of electric lanterns were used within range of gas fumes or in dust-filled rooms.

The Federal Electric Lantern was invented by a railroad man who had had numerous opportunities to see the disastrous results of having lighted lanterns in gas-filled freight cars or too close to tank cars from which gas fumes were escaping. It is the result of long, painstaking study, during which every precaution was taken to make it the super-safety lantern. This explains why the lantern has been approved by various public and semi-public bodies interested in safety, such as the Western General Managers' Association, the Bureau of Explosives Laboratory, and F. F. Burroughs, engineer of the Millers National Insurance Co. The two bodies named and Mr. Burroughs made exhaustive tests before they gave their approval to the lantern.

On this lantern no switch is exposed. The switch is inside of the lantern and no spark can escape from it, the light goes out when the handle is tipped down on one side and the light is turned on when the handle is tipped down on the other side. The light cannot be turned on or off except when desired—because the handle must be tipped all the way to the base of the lantern. Its general utility as a safety lamp has caused it to be used in many industries where there is danger of explosion from dust or oil or gas fumes.

Firemen are often in places where it is dangerous to use oil lanterns and have used Federal lanterns with great success. Many firemen have been killed because they brought oil lanterns into gas-filled rooms. These lanterns are popular in the milling industry also. Elevators and mills and other places where various grains are stored, frequently house clouds of dust which only a spark is required to explode. Dust explosions are produced by the rapid combustion of small particles of combustible matter suspended in the air. Any kind of dust containing carbon, such as the dust from grain, flour, sugar, rice, feed, and so forth, is highly inflammable. The small spark needed to cause it to explode may be supplied in various ways, but it is not infrequently from the flame of candles and oil lanterns. Many a man has innocently lit a match in a dust-filled chamber and has not lived to tell what happened. For a long time, the cause of these sudden explosions were not understood. Incendiaries were suspected and many innocent persons were accused before it was discovered that the fires were caused by the explosion of dust.

Dust explosions cost many lives and millions of dollars of property annually. For instance, in 1919, a single fire in a warehouse resulting from a dust explosion caused a property loss of over $2,000,000. During 1919, dust explosions cost eighty lives and a $7,000,000 property loss. To light a match or to bring a lighted candle or oil lantern into a dust filled room is to invite disaster.

Loss of oil from fires has been estimated to have been $250,000,000 annually during the last 15 years. Many of the fires, causing enormous losses, were started by oil lanterns, candles or flames coming in contact with gas fumes escaping from oil wells or containers. Some of the oil well fires have lasted for days and each day has cost its owners thousands of dollars.

The Spindle Top conflagration was started by a careless workman. He was inspecting tanks at night with an oil lantern. Gas from the tank came in contact with the flame of the lantern and in a second blazing drops of oil had been sent flying in all directions. Wells and tanks were the first to be ignited, but oil soaked buildings and open pools behind the dykes were soon ablaze. It was a fortnight before the fire was extinguished. The damage was tremendous.

The Federal electric lantern is so constructed that it casts no shadows on the ground. It is absolutely free from any possibility of short circuit. It cannot be put out by wind nor will it go out in smoke or dust-filled rooms. The battery has 4 dry cells of 1½ volts each, making a battery of great recuperative powers.

UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

ANTI-SLIP TREADS—American Abrasive Metals Co., Mfr., 50 Church St., New York, N. Y.

AUTOMATIC SWITCHES—CLOCK OPERATED TYPE—Mercury Time Switch Co., Mfr., 2230 E. Canfield Ave., Detroit, Mich.

AUTOMATIC SWITCHES — MAGNETICALLY OPERATED TYPE—Industrial Controller Co., Mfr., Milwaukee, Wis.

AUTOMATIC SWITCHES — MAGNETICALLY OPERATED TYPE—Palmer Electric & Mfg. Co., The, Mfr., 175 Fifth St., East Cambridge, Mass.

CABINET AND CUTOUT BOXES — SHEET METAL—Mutual Electric & Machine Co., Mfr., 858 W. Fort St., Detroit, Mich.

CARTRIDGE ENCLOSED FUSES—RENEWABLE TYPE—Federal Electric Co., 8700 S. State St., Chicago, Ill.

CARTRIDGE ENCLOSED FUSES — NON-RENEWABLE—Metropolitan Electric Mfg. Co., Mfr., Blvd. & 14th St., L. I. City, N. Y.

CARTRIDGE ENCLOSED FUSES—RENEWABLE —Pierce Fuse Corp., Mfr., 752 Main St., Buffalo, N. Y.

CHEMICAL ENGINE HOSE—Diamond Rubber Co., Submittor, Akron, O.

CHEMICAL FIRE EXTINGUISHER, 1½-QT. PUMP TYPE—Booth-Cutler Copper & Brass Co., The, Mfr., 115-21 Sumach St., Toronto, Ont., Can.

CLASS C BUILT-UP ROOF COVERINGS—Lehon Co., The, Mfr., W. 44th St. & Oakley Ave., Chicago, Ill.

CONDUIT BOXES—Electrical Fittings & Foundry, Ltd., Mfr., 331 King St., West, Toronto, Ont.

CONDUIT BOXES—Fratt-Chuck Co., The, Submittor, Frankfort, N. Y.

CONDUIT BOXES—Thomas & Betts Co., Submittor, 63 Vesey St., New York, N. Y.

CONDUIT FITTINGS—LOCK WASHERS—Central Nut Lock Co., Mfr., McCormick Bldg., Chicago, Ill.

ENCLOSED SWITCHES—Allen-Bradley Co., Mfr., Milwaukee, Wis.

ENCLOSED SWITCHES—Brown & Pengilly, Mfr., 607 E. Fourth St., Los Angeles, Cal.

ENCLOSED SWITCHES—Safety Electric Products Co., Inc., Mfr., 1548 Central Ave., Los Angeles, Cal.

ENCLOSED SWITCHES—Square D Co., Mfr., Detroit, Mich.

FIXTURES—Cryptofil Mfg. Co., Mfr., 859 Boylston St., Boston, Mass.

FIXTURE FITTINGS—Feerless Light Co., Mfr., 663 W. Washington Blvd., Chicago, Ill.

FLEXIBLE STEEL CONDUIT—American Metal Moulding Co., Mfr., 141 N. J. Railroad Ave., Newark, N. J.

FLEXIBLE STEEL CONDUIT—Arrow Flexible Conduit Co., Inc., Mfr., 212 Canal St., New York, N. Y.

FLEXIBLE STEEL CONDUIT—Federal Armored Cable Co., Mfr., 609 West 48th St., New York, N. Y.

FLEXIBLE TUBING—Eastern Tube & Tool Co., Inc., Mfr., 41-59 Gardner Ave., Brooklyn, N. Y.

FUSELESS ATTACHMENT PLUG—Russell & Stoll Co., Mfr., 17-27 Vandewater St., New York, N. Y.

FUSIBLE LINK—Slater Co., N., Ltd., Mfr., Hamilton, Ont., Can.

GAS SHUT-OFF VALVES—Fire & Gas Appliance Co., Submittor, 165 Broadway, New York, N. Y.

HARDWARE—SLIDING PATTERN—Slater Co., N. Ltd., Mfr., Hamilton, Ont., Can.

HARDWARE—SLIDING PATTERN—Yager Sheet Metal Co., Mfr., 3509 Chestnut St., Oakland, Cal.

HOLLOW METAL FIRE WINDOW FRAMES—Burton Co., W. J., Mfr., 5650 Federal St., Detroit, Mich.

HOLLOW METAL FIRE WINDOW FRAME—Campbell Metal Window Corp., Mfr. & W. 40th St., New York, N. Y.; care Bartlett-Hayward Co., Scott & McHenry Sts., Baltimore, Md.

HOLLOW METAL FIRE WINDOW FRAMES—Jackson Co., W. H., Mfr., 335-61 Carroll St., Brooklyn, N. Y.

INSIDE, HAND-OPERATED DISCHARGE DEVICES—Western Oil Fump & Tank Co., Mfr., 2437 Kosciusko St., St. Louis, Mo.

INTERIOR WALL, CEILING AND PARTITION FINISH—Bestwall Mfg. Co., Submittor, Buffalo, N. Y.

INTERNAL COMBUSTION ENGINE, ELECTRIC PLANT—Electric Auto-Lite Corp., Mfr., Willys Light Div., Toledo, O.

PENDANT SWITCHES—Beaver Machine & Tool Co., Inc., Mfr., 625 N. Third St., Newark, N. J.

PLUG FUSE CUTOUT BASES—Metropolitan Device Corp., Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

PLUG FUSE CUTOUT BASES—Oriole Electric Mfg. Co., Mfr., South Norwalk, Conn.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Delta-Star Electric Co., Mfr., 2423-43 Fulton St., Chicago, Ill.

RESISTANCE APPLIANCES — Cutler-Hammer Mfg. Co., The, Mfr., Milwaukee, Wis.

ROLLING STEEL FIRE DOORS—Wilson Corp., J. G., The, Mfr., Norfolk, Va.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Christen & Sons, Fred, Mfr., 714-22 George St., Toledo, O.

SLIDING OR SWINGING, TIN-CLAD FIRE WALL DOOR—Detroit Cornice & Slate Co., Mfr., 739 Antoine St., Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD FIRE WALL DOOR—Flood & Hall, Mfr., 1782 18th St., Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD FIRE WALL DOOR—Mahon Co., The, R. C., Mfr., 6540 St. Aubin Ave., Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD FIRE WALL DOOR—Wittstock Bros., Mfr., 3117 E. Warren Ave., Detroit, Mich.

SURFACE SWITCHES—Hart Mfg. Co., The, Mfr., Hartford, Conn.

SWITCH BOXES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

SWITCH BOXES—Crouse-Hinds Co., Syracuse, N. Y.

SWITCH BOXES—Sprague Electric Works of General Electric Co., 527 W. 34th St., New York, N. Y.

TEMPERATURE REGULATING APPLIANCES —Taylor Instrument Companies, Mfr., Rochester, N. Y.

UNDERGROUND STORAGE TANKS—Detroit Range Boiler Co., Mfr., 2475 24th St., Detroit, Mich.

WASTE CANS—Non-Explosive Can & Tube Co., Mfr., 127 S. Green St., Chicago, Ill.

Safety Engineering

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National Fire Protection Association

San Francisco, June 14, 15 and 16, 1921

TUESDAY, JUNE 14. MORNING SESSION, 10 O'CLOCK

President's Address. Appointment of Committee on Resolutions.
Report of the Executive Committee. Resolutions.
Reports of the Secretary-Treasurer and Editor of the Quarterly.
Amendments to Articles of Association Committee Report.
Membership Committee Report. Public Information Committee Report.
Five-Minute Reports from Local Chapters and Organization Members on Work in Fire Prevention.
Canadian Committee Report. Fire Prevention Day Committee Report.
Laws and Ordinances Committee Report. Automatic Sprinklers Committee Report.
Manufacturing Risks and Special Hazards Committee Report. Field Practice Committee Report.
Safety to Life Committee Report. Docks, Piers and Wharves Committee Report.
Marine Fire Hazards Committee Report.

WEDNESDAY, JUNE 15. MORNING SESSION, 10 O'CLOCK

Electrical Committee Report. Signaling Systems Committee Report.
Building Construction Committee Report. Small Hose Couplings Committee Report.
Private Fire Supplies from Public Mains Committee Report.
San Francisco's High Pressure Fire Service System: Address by Thomas R. Murphy, Chief of San Francisco Fire Department.

Special Program, Wednesday Afternoon

Luncheon, Arranged by San Francisco Chapter, Palace Hotel, 12:30.
Demonstration of High Pressure Service System in Operation, 2:00.
Automobile Tour of the City, and Ride over Twin Peaks; Inspection of the City Water Supply for Fire Fighting Purposes.

THURSDAY, JUNE 16. MORNING SESSION, 10 O'CLOCK

Gases Committee Report. Inflammable Liquids Committee Report.
Smoking and Forest Fires: Address by Paul C. Redington, District Forester, U. S. Forest Service.
Hazardous Chemicals and Explosives Committee Report.
Report of Committee on Resolutions. New Business.
Report of Nominating Committee and Election of Officers.

Safety in Relation to Electrical Appliances

By Dana Pierce

Head of Electrical Division, Underwriters' Laboratories, and Resident Vice President in New York

Proceedings of the American Society of Safety Engineers

THE subject of safety or of accident hazards with reference to electrical appliances is one which has received a great deal of attention in recent years but is new compared with the study of the fire hazard of electricity. The terms accident hazard and fire hazard are used in their common colloquial sense, no formal definitions or distinctions being considered necessary here.

The results of the study of accident hazards are embodied in the National Electrical Safety Code of the Bureau of Standards and the generally accepted code on fire hazards is the National Electrical Code of the National Board of Fire Underwriters.

The safety code is about 4 years old and the fire code is about 24 years old. Both codes are the result of years of study by all sorts of persons and associations and both are to be regarded as representing the best present consensus of opinion while being susceptible of further revisions in the light of changes in the art, the developments of invention and the accumulation of experience.

The last edition of the Safety Code is that recently issued by the Bureau of Standards, the third edition, dated October 31, 1920.

It is not my intention to attempt a description of the history of these codes or, still less, a résumé of their contents. For these reference must be made to the codes themselves.

FUNDAMENTAL IDEAS OF SAFETY AND ACCIDENT PREVENTION

The purpose of this paper is to state the fundamental ideas of safety and accident prevention in the electrical field, to describe the general aspects of the problems involved and to illustrate some of these by reference to certain classes of appliances.

The uses of electricity are so numerous and the number of devices and machines employed is so great that anything like a complete discussion is manifestly impossible in a brief article.

Furthermore, the methods by which safety may be secured are matters of detail, varying with the device, its location, size, method of use and the sort of person using it.

Electrical safety is an art rather than a science. It involves, as do all safety efforts, a large human element in addition to its economic and technical phases. What the employer *can* do and can pay for is one element. Habits and necessities of employes as well as their welfare must be given consideration. Perfection is unattainable, even if we could all agree what it is.

Electricity may cause accidents in just two ways:

By shock,

By burns.

To these must be added the mechanical causes of injury from moving machinery and the like which are possible in all apparatus whether electrical or not.

PROTECTION AGAINST SHOCK

Protection against shock is obtained by insulating current-carrying parts which may be touched, and the possibility that the insulation may at times be defective indicates the need of special precautions in some cases. Most power circuits are so arranged that some cur-

rent will flow through a person touching live parts of them to the ground. By ground is meant not only the earth itself but any floor, pipe, wire or other conducting object in more or less direct electrical connection with the earth.

Prevention of shock, therefore, requires that we consider such objects as possible paths for current at all times.

Dirt and moisture increase the liability of such a path being established for a dangerous current through a person's body. This is still another argument pointing to the necessity for good housekeeping.

The hazard of shock increases with the voltages. There are some well authenticated cases of fatal shock from a voltage of 110, the usual lamp circuit voltage. The danger is believed to be small to persons in fair physical condition unless the contact made with the circuit is extremely good and is long continued.

A voltage of 220 is, of course, more dangerous. At 440 volts and over the hazard becomes very real and anything over 600 or 1,000 volts must be treated with respect and constant caution. It is not possible to say where real danger begins nor is it necessary, at least over 150 volts. By these voltages we usually mean in safety work the voltage from the circuit to the ground and not the voltage across the two sides of the line, but this distinction is not uniformly made.

THE KILLING CURRENT

I do not know of any very reliable data as to the amount of current that will kill. This varies with the voltage. It at least appears certain that the killing current under most conditions and at common voltages is very small if measured in amperes—small, that is, as compared with the currents taken by common devices, lamps, household and factory appliances, small motors and so forth. The amount of current sufficient to cause fatal shock is sometimes stated as 100 milliamperes at 600 volts.

PROTECTIVE GROUNDING

Protective grounding is one of the chief methods of safeguarding electric appliances and is practiced in two general ways: (1) by connecting one wire of the distributing system to the ground and (2) by grounding the enclosures, frames and other metallic parts of equipment.

The grounding of the circuit has the effect of limiting the difference of potential (voltage) which can exist between other wires or connected apparatus and the ground. The exact conditions for grounding circuits and the methods of doing it should be studied in the two codes, both of which deal with it. The details cannot be explained here. Grounding circuits is especially important when a normally low-voltage circuit such as 230 volts is exposed to possible contact at some points with a circuit of higher voltages. An ordinary type of transformer for alternating current power distribution receives power at 2300 volts on one of its windings and delivers 230-volt power from the other winding. A failure of insulation between these windings in the transformer or a cross between low and high voltage wires outside will impose the 2300 volts on the 230-volt wires and everything connected to them. Grounding the low-voltage side gives this high-voltage a path to ground where it is harmless. Evidently, the permanence and excellence of the ground connection are of prime importance and there should be no fuses in the ground wire to open up and remove the ground.

OBJECTIONS THAT ARE NOW THINGS OF THE PAST

In years past, there has been no little objection to grounding circuits on the part of fire underwriters, but this has now passed and protective grounding of circuits is now very general and is being adopted rapidly in territories where it has not before been favored.

The city authorities and others in control of water companies long objected to grounded power circuits because of supposed injury to underground water pipe systems. More recent investigations have proved these fears almost wholly unnecessary and the former objections are now rarely made.

It cannot be too clearly stated that the proper grounding of power circuits un-

der all conditions requires skill, experience and a thorough knowledge of electrical power theory and operating. Correctly done grounding of circuits is one of the chief safeguards at our disposal.

ENCLOSING FRAMES AND NON-CURRENT-CARRYING METAL PARTS

The protective grounding of enclosure frames and the non-current carrying metal parts of equipment is a simpler matter. In general, its purpose is to prepare in advance a current path to the earth so that in the event of the failure of insulation making the enclosure "alive" the current may have a route to ground other than through the body of a person. In other words, if a motor frame is connected to the ground, it will have the same potential as the ground on which a man touching it stands and, therefore, current will not pass to the ground through him.

Where such an enclosure cannot be grounded for operating or other reasons, then the man must be insulated by a flat form, mat, gloves or some or all such means. Of the two general methods, the grounding method is the better where feasible.

There is one aspect of grounding enclosures, however, that is not always remembered. A switch in a grounded box is a case in point. If the use of the switch requires an operator to touch or come near live parts the proximity of the grounded box may actually increase his danger. If the box is closed and grounded, he cannot get hurt from it. Therefore, external operation of the device by an outside handle, for instance, is a natural complement to the enclosing of the device.

PROTECTION AGAINST BURNING

For the purpose of protection against the other main direct hazard from electrical appliances, burning, the obvious recourse is to enclosure of apparatus in tight cases or their isolation to prevent approach to them when operating. To these may be added the use of goggles and protective clothing. In many cases, remote-control of switches and other current breaking devices lessens the hazard, and these forms of appliances are becoming more and more general.

HAZARDS OF A MECHANICAL NATURE

In addition to the hazards from shocks and burns, as essentially electrical effects, we may briefly mention some other hazards which are of a more mechanical nature. On these, we quote from a recent safety standard of the Electrical Safety Conference:

Explosion of Fuses.—Fuses used to protect apparatus against overloads and short circuits, especially on large power circuits and with the apparatus near the generating station, occasionally explode with great violence. Such a condition is a possible cause of accident.

Gas or Dust Explosion.—Where apparatus is in an atmosphere containing certain quantities of inflammable gas, or inflammable dust or flyings, there is danger that an arc or flash at the controller may ignite this mixture, causing a fire and sometimes an explosion.

Moving Parts of a Controller.—Persons near the apparatus may be injured by being struck by the handles or levers of circuit-breakers, and similar parts of the controller which may move suddenly and unexpectedly, unless these parts are properly located and guarded.

Phase Reversal.—With certain classes of machinery, such as elevators, cranes and hoists, the motor and load may not move in the expected direction with reference to the operating lever or handle of the controller because of an accidental phase reversal of the supply circuit. This may result in injury to persons because of unexpected direction of motion or confusion of the operator; it may in some cases result in failure of the limit switches and in injury to the machine itself.

Unexpected Starting.—Persons may be injured by moving parts of the motor or driven machinery, should the motor be started unexpectedly by another person, or by restoration of voltage after failure of voltage.

Over-Speed.—Motors and motor-driven machinery may run at excessive and dangerous speeds because of some change in operating conditions, such as (a) separately excited direct-current motors losing their excitation; (b) series motors losing their load.

Lack of Emergency Stop at Point of Operation.—The operator of such machines as mixing rolls and calenders may be caught by the machinery and seriously injured if the machine is not immediately stopped by an emergency device.

Over-Travel.—Certain machinery, such as elevators and some hoists, unless stopped within certain limits may do serious damage to persons and to the machinery. Since the operator cannot be relied upon to stop the machine at the limits, some device, such as a limit switch, must be arranged to do so automatically.

Failure of Power.—Failure of power may

cause injury to persons with such machines as cranes or hoists, unless the machine is equipped with a suitable device to stop and hold the load.

Current Overload.—Excessive current by overheating some part of the motor, controller or wiring may ignite nearby combustible material or so damage the insulation as to leave the equipment in a dangerous condition.

ACCIDENT PREVENTION RULES FOR ELECTRICAL APPARATUS

In prescribing accident prevention rules for electrical apparatus, it is necessary to distinguish quite clearly several classes of persons to be protected and the methods employed must vary according to whether all of these classes or only one of them is involved. The classes may be named as follows: qualified persons, operators and other persons.

THE QUALIFIED PERSON

By qualified person is meant one who is familiar with the construction and operation of the apparatus and who is assumed to have some appreciation of the hazards involved. Skilled electricians, inspectors, and other more or less expert persons may properly be included under this term. The ordinary shop foreman should not be considered a qualified person unless he has special knowledge of electrical matters and experience in dealing with them. The qualified person is supposed to be able to make inspections and adjustments of apparatus, to enter rooms where high voltage equipment is installed, to open or remove enclosures for replacement of fuses, and in general to perform those operations necessary to the general maintenance of equipment. The qualified person, of course, is entitled to all the protection which the circumstances of his work permit but he cannot be protected under all conditions and a certain degree of dependence must be placed upon his individual intelligence, knowledge, skill and experience. Many of the safeguards which it is possible to place around electrical appliances will fail of their purpose if all sorts of persons are permitted to perform this special and more hazardous operation. Such qualified persons should have sole charge of the locks, rooms, guards, disconnecting switches and other protective devices. An ordinary workman should be prohibited from performing the duties of a qualified person. No safety program can successfully be carried out without constant attention to the human element and the distinction between the expert and the ordinary employe. The proverb that a little knowledge is a dangerous thing finds no better illustration than in the risks incurred by a person with imperfect knowledge of electrical affairs attempting to operate electrical machinery.

THE OPERATOR

By operator we mean a person who is authorized to actuate or handle the equipment. He uses the equipment to run his machine and, as he probably knows little about the electric device, the protection afforded him must be more complete and be maintained more persistently than for the expert. He may properly open and close switches directly affecting his work but such switches should be so enclosed that he cannot expose himself to shock or burns.

He may be trusted to replace fuses only when provision is made so that he need not handle any live parts in so doing.

THE ORDINARY WORKMAN OR PASSERBY

The third class of persons includes the ordinary workman or passerby who may inadvertently touch electrical apparatus or be affected by its failure in operation. As his attention will generally be on something else than the electrical devices and he must be assumed to have no appreciation of the dangers to which he may be exposed, we must guard against his injury even more carefully. Enclosures and the insulation of apparatus as far as practicable are in his interest.

METHODS OF PROTECTION

When we attempt to provide protection, we may do it either by constructing each part of the apparatus so that it includes the necessary safeguards in itself or we may remove apparatus which presents hazards or protect it by guards or gratings or by putting it in separate rooms. It is not necessary that the man-

ufacturer of an electrical device should make it so that it can always and everywhere be used in safety. To do so would add an intolerable expense to equipment, which would defeat the purpose. If apparatus cannot be placed so high on the wall or surrounded by guards and screens to make it safe, then, of course, the protective features must be built into the device itself. It is an economic question in every given installation how the results for safety may be secured with certainty by a proper combination of protection by construction and protection by installation. It is just here that the skill and experience of a safety engineer has one of its best opportunities.

MANUFACTURERS ARE MAKING SAFER EQUIPMENT

The last few years have shown a very notable increase in the interest of manufacturers in providing safer electrical equipment. The old open knife switch is rapidly being displaced by enclosed or safety switches, which are now available in a great variety of forms, many obtainable at a price so little above that of open switches as to make the use of the latter inexcusable except where, as on switchboards or other places, only qualified persons may approach or use them.. Several of the larger companies are rapidly redesigning whole lines of switches, circuit breakers, motor controllers and other power apparatus to provide the safeguards prescribed by safety rules. In fact, it may be stated that one of the most strongly marked tendencies of present day electrical design is in this direction of safeguarding persons from injury. Like all movements for the betterment of society, this development is marked by animated and sometimes violent disagreement as to what is necessary and as to the rate at which progress can be made without imposing upon industry undue expense.

ORDINARY HOUSES AND OFFICE BUILDINGS

As applied to electrical equipments for ordinary houses, offices and other buildings than factories, the present tendency is strongly in the direction of so making and installing wires and connected devices that there will be no exposed live metal parts and no other metal parts liable to become alive which are not effectively grounded. Thus the present tendency is to ground fixtures to the conduits or other supports rather than to insulate them. The ordinary lighting panelboard formerly presented when one opened the door a mass of live copper parts, switches and fuses. The present safety panelboard shows only insulated handles and covers either of insulating material or of grounded metal. A wholly inexpert person can thus use them for ordinary purposes with practical safety. The frames of electric ranges and other stationary equipment are now usually grounded in some manner.

GROUNDING OUTSIDE CASINGS OF PORTABLE DEVICES

In England, there has been some development in the way of grounding the outside casings of portable devices such as portable lamps, heaters and the like. While this is unquestionably a desirable thing from the point of view of safety, its practical accomplishment involves very real difficulties in changing American practice. It means that a third wire must be used, connected to the case of the appliance and at the other end to a permanent ground. Means must be provided to make sure that the ground wire is not confused with the circuit wire or worse results than in any ungrounded system may follow. The practical solution of this question of grounding portable devices has not yet been worked out except in a few instances. The suggestion has been made that metal cases be connected to the grounded wire of the electric circuit itself where there is such a wire but there are real objections to this both in practical application and theoretically. The present feeling is that the grounded side of the circuits should not be connected to exposed parts or depended on for grounding frames, sockets, casings, fixtures and the like.

INSTALLATION AND OPERATION OF POWER LINES

Some of the most important questions in electrical safety have to do with the

installation and operation of power lines and connected outside apparatus but these are questions which it is impossible to discuss even briefly in a paper of this sort. The National Electrical Safety Code treats of them exhaustively.

State and municipal commissions throughout the entire country are interesting themselves more and more in safety rules for electricity. In several States, special codes have either been drawn up or are now in preparation. Some of these are combinations of the rules of the Fire Code and of the Safety Code. There is still much difference of opinion as to the desirability of attempting such a combination of rules. The Associated Manufacturers of Electrical Supplies, the Bureau of Standards, Electric Power Club, National Workmen's Compensation Service Bureau and Underwriters' Laboratories have associated themselves in what is known as the Electrical Safety Conference and through special committees are developing a very useful set of detailed standards or safety codes for electrical appliances and systems. One such code, that on industrial control equipment, has been published and is now available for distribution. Other codes in process will cover enclosed switches, rotating machinery, switchboards and circuit breakers and other topics.

LABORATORIES' TESTS OF FIRE AND ACCIDENT HAZARDS

Underwriters' Laboratories is prepared to list electrical devices as approved either from the point of view of fire hazard alone or from the points of view of both fire and accident hazard. In all its examinations and tests it pays attention to the accident hazards involved and aims to follow the best standards for the protection of persons as well as for the protection of property. In its testing, constant attention is given to the problems of insulation and, of course, to the mechanical excellence and durability of appliances. Elaborate special equipments have been provided in both Chicago and New York for thorough testing of fuses of all types. These equipments involve the use of large power batteries on which fuses are short-circuited under conditions representing the most severe service conditions liable to be encountered. These equipments are in almost constant use in testing the developments of new fuses and in check tests of standard lines. Switches are put through operating tests to show that they have adequate margin of safety as switches, are adequately insulated, and that they are strong enough to stand up under hard usage.

Similarly, sockets, circuit breakers, heaters and an endless variety of special appliances as well as of the standard wiring devices are under standard test either as new developments or in the use of the Laboratories' follow-up service and factory inspection and labelling. With the co-operation of the wire industry, code wire is continually tested at the factories where it is made under the Laboratories' supervision, with the result that code wire today enjoys the reputation of dependability.

Underwriters' Laboratories is in constant relation to the various branches of the electrical manufacturing industry through its Industry Conferences on which manufacturers are represented. The Laboratories also co-operate actively on the committee work of numerous electrical associations and with State and municipal officers. Through these channels more and more work is being done in electrical safety and many intricate and difficult technical and economic questions involved are being worked out to a generally acceptable conclusion. The desirability of having tests both for fire and accident hazards conducted by properly qualified laboratories where experience and standards can be registered is evident and its utility is being daily demonstrated.

ELECTRICITY CAN BE MADE SAFE

Changes in the electrical arts are so rapid that this work can never reach a final conclusion. New inventions, applications, and methods appear daily. Electrical energy is being utilized each year in even wider fields and is affecting interests of more industries and of more people. Electricity can be made safe and it may fairly be claimed that the developments in safeguards are keeping

well up with other developments in the art. The extremist who demands immediate perfection has not yet reached his goal in electrical safety affairs any more than in any other human relations. He serves a useful purpose in pointing out the road but his ideas must be supplemented by constant level-headed attention to details and to the practical limitations imposed by questions of cost and of habit. Perhaps we may say that the ideal safety engineer is the man who combines an ardent enthusiasm for perfect protection of his fellows against the accidents of life and work with a sound knowledge of the principles of science and its practical applications, and utilizes them both with that common sense which is a measure of a man's wisdom and efficiency.

Organization, Scope and Service of Underwriters' Laboratories

By George B. Muldaur

General Agent, Underwriters' Laboratories

Proceedings of the American Society of Safety Engineers

UNDERWRITERS' LABORATORIES, INC., is the technical school of the University of Fire and Accident Prevention. Education is the one underlying and essential element in the fight against the Nation's appalling loss of life and property from fire and accident, and the Laboratories afford means of studying machinery, devices, and apparatus in their relation exclusively to safety.

The basic principle of the Laboratories is Service, Not Profit. While a fee is charged manufacturers who submit materials for test, this is so graded as to cover the actual cost plus a small percentage for maintenance only, and is not a factor in the selling price. No one receives a dividend. The laboratories do no consulting or commercial work and are not in competition with any technical, scientific, or engineering organization.

BEST EXAMPLE OF FIRE RESISTIVE CONSTRUCTION IN EXISTENCE

The main offices and testing plant, Chicago, occupy a 3-story building, perhaps the best example of fire resistive construction in existence. It is built wholly of brick, terra cotta, stone, concrete and steel, and is equipped throughout with steel furniture, cabinets, and filing cases. Only the chairs are of wood and there are no rugs or curtains. All trim is of metal and the windows are of wire glass. Although there is nothing in the building to burn, a complete automatic sprinkler system and a fire extinguisher equipment are provided and fire doors are placed on all floors where they would be required under ordinary conditions. The building is intended to serve as an object lesson and a model in modern fireproof construction. The public is encouraged to inspect it at all times.

SAFETY AND BEAUTY GO HAND IN HAND

In order to show that safety and beauty may go hand in hand, especial care has been given to the selection of the material used for interior finish. Warm-toned tapestry brick, tile, and terra cotta are combined so artistically that the offices compare favorably with the best in comfort, dignity and architectural beauty.

The second floor is given over to the private offices of the executives and to the general administration. On the third floor are the chemical and electrical

laboratories, the casualty and automotive department, the drafting room, and certain special research laboratories. The ground floor and the court contain the heavy machinery, furnaces, machine shops and tools for an endless variety of tests.

METHODS AND APPARATUS FOR MAKING TESTS

The ponderous column-testing machine, in which a column of steel, concrete, wood or iron is subjected to hydraulic pressure equivalent to anything it could conceivably bear in practice and at the same time to direct flames paralleling actual conflagration conditions, is one of the most interesting. Instruments of precision record the exact pressure, heat, and deflection up to the point of failure. Safes are heated in a specially designed gas furnace for a given number of hours and, while at their greatest heat, are hoisted to the height of a 3-story building and dropped on a pile of bricks. If the contents, consisting of books and papers, are unharmed by this treatment, the test is considered satisfactory.

Flooring and roofing materials are tested for fire resistive qualities in a variety of ways. Wire glass windows, automatic fire doors, fire walls and refractory materials are tested by fire and while hot are deluged with water from a fire hose. Everything is given the treatment it would get under the most severe conditions of actual service. The equipment ranges from giant presses and tensile machines to the miniature pile driver used to test the force necessary to ignite a match.

The hydraulic equipment is particularly complete, as hose, sprinkler systems, and valves form an important part of the daily run of tests.

There is also a branch laboratory in New York, where electrical tests are carried out, under the direction of Dana Pierce, the resident vice president, and a staff of engineers and inspectors.

The casualty department takes care of all devices relating to industrial accident hazard, machinery guards and safety appliances, and the recently organized automobile department is concerned with items of collision, theft and fire.

Co-operation with the recognized organization having jurisdiction over each class of work is a feature of the Laboratories' operations. Arrangements also exist with the Federal Government, through the Bureau of Standards and the Bureau of Mines, whereby technical matters in controversy may be submitted to either bureau for arbitration.

HOW LABORATORIES' APPROVAL IS ATTAINED, AND WHAT IT MEANS

Devices submitted to the Laboratories for listing are first tested by the engineers in charge of the special class of work to which they apply. The standards to which such devices must attain to receive approval are not arbitrary, nor are they the result of the Laboratories' researches alone. They are determined by the best recognized practice and in consultation with so-called industry conferences appointed from the most prominent experts in their special fields. An important feature of the Laboratories' service is the advice and assistance they are enabled to give to manufacturers in perfecting devices shown by the preliminary tests to be sub-standard.

When a favorable report has been rendered by the engineers of tests, it is not yet ready to issue, but is first submitted to one of four Councils (Fire, Casualty, Electrical or Automobile) for confirmation, amendment or rejection by letter ballot. The total of the Council memberships is 115.

The Councils are composed of experts, scientists, engineers, and insurance officials, having no connection with any manufacturing or merchandising organization. If the vote of the Council is favorable the device passes into the class of listed articles. A summary of the report is printed on a card, which is filed with others according to classification, and cabinets containing these card systems are maintained in the offices of the principal boards of underwriters and inspection bureaus throughout the country, as well as by many public and private organizations, Government, State and Municipal departments. Lists of inspected appliances are also freely distributed to persons interested, especially

to builders and building owners, architects, electrical contractors—everyone, in short, who has the selection of materials, machinery or devices bearing upon safety of property and life. The Laboratories' lists eliminate chance and place in the hands of responsible persons a certain means of determining what is worthy of confidence. The listing of any device is in itself a favorable report, reduced to its lowest terms. Should the complete report be required it may be had by persons showing a proper reason for asking it.

THREE FORMS OF FOLLOW-UP SERVICE

In order that any device, once passed and listed, shall be known to maintain the standard of excellence certified by the Laboratories' favorable action, three forms of follow-up service have been adopted, any one of which may be selected by the manufacturer. The oldest of these, Re-examination Service, consists of tests made from time to time of samples obtained in the open market by the Laboratories' representatives. The manufacturer is advised of any finding that indicates deterioration and given an opportunity to make corrections. Should these tests show that the device is in danger of becoming sub-standard, approval is withheld until the original excellence is re-established.

Inspection Service, the second form of follow-up, comprises tests made by Laboratories' engineers at the factory during manufacture. The results are the same as in the Re-examination Service, but the plan is considered somewhat more effective as coming closer to the source of supply and tending to correct deviations from the normal more promptly.

FIVE HUNDRED MILLION LABELS IN 1920

The third and best follow-up plan thus devised is the Label Service. This, as the name implies, consists simply of affixing the Laboratories' label at the factory to such goods as are shown to be standard by the tests of the Laboratories' engineers on the spot. The labels are recognized wherever found and afford an instant proof of excellence. A check is kept by constant additional tests of labeled articles bought in the open market and sent in by inspectors. So satisfactory, both to manufacturer and user, has the label service become that upwards of 500,000,000 labels were issued during the past year and it is customary to consider the label a passport requiring no further investigation. It is recognized by inspection bureaus and boards having jurisdiction over the selection and use of materials and appliances relating to safety from fire and accident, not because of any authority or guarantee of recognition on the Laboratories' part but solely owing to the reputation built up and sustained for upward of 25 years.

There is truth in the lyrical slogan, "Look for the label and you can't go wrong!"

Dutch Museum Asks Co-operation

DIRECTOR R. A. GORTER, of the Safety Museum (Véiligheidsmuseum), 22 Hobbemastraat, Amsterdam, has issued an appeal to American industrial organizations which carry on safety campaigns to send him samples of their campaign literature for use in a safety exhibition.

The Director informs SAFETY ENGINEERING that posters, illustrations of safety suggestion boxes, safety bulletin boards, buttons and badges, medals and advertisements, are listed by the Safety Museum among the objects desired for exhibit. Any other examples of material used to promote safety by American factories and workshops will be of interest to employers in Holland, and are requested to be sent to the Director of the Museum at the above address.

Building Department's Viewpoint of Safety in Demolition

By Frederick C. Kuehnle

Chief Inspector of Buildings, Manhattan

Proceedings of the American Society of Safety Engineers

THE safeguards provided in the building code of the City of New York are very simple and very few. They are covered under two sections of the Building Code. Section No. 191 is the principal thing for the so-called pedestrian, the man on the street, or the workman who goes into the building. It requires that all buildings that are being demolished that are 40 feet or over in height must have a substantial sidewalk shed, and no work is supposed to be done on removing any part of the exterior of the building until the shed is up. Of course, if the structure is less than 40 feet in height, we require the contractor to put a fence in front of the building, about 6 feet away from the building line, so that no one can wander into the zone where there may be danger. Sidewalk sheds are always stumbling blocks to the building bureau, from a demolition point of view. The demolition contractors always want to treat them as temporary sheds, sheds that are to stay up for a week or two weeks or three weeks, when the building will be down and the sheds may be removed. Where we have non-fireproof buildings to be demolished, the contractor usually depends upon material to be taken out of the upper stories with which to construct his shed.

We have never found that we got any result that way. Nine times out of ten, the contractor will start in with a 3x8 upright, and he expects that to hold the thing. He will say: "This is a temporary shed. It is only going to take three weeks to take down this building."

SPECIFICATIONS FOR SIDEWALK SHEDS

Accidents are not based on time. They happen all the time. We are called upon, continually, to persuade contractors and their men to see it from our viewpoint. In 1910, Mr. Rudolph P. Miller, Superintendent of Buildings, issued a bulletin, in which he described the kind of sidewalk shed, a substantial shed, that would be expected by the Bureau of Buildings. The contractors can build it as much stronger as they wish, but not less strong. The specifications call for an 8x8 upright, and for a sill-plate and for proper girders and for 3x8 and 3x10 floor beams on 20-inch centers. Now that is a substantial sidewalk shed for the protection of pedestrians and the men going in and out of the building while it is being demolished. There is no such thing as a demolition shed. We recognize purely a substantial sidewalk shed.

The demolition men who erect sheds from the material they take down must be continually asked to reinforce the strength of their sheds. We are after them all the time. Our inspection force is not so large that it can spend unlimited time on any particular structure. Our inspectors have a territory of probably a mile square, and they go to see whether any violations are being committed. In other words, they are really a special police force. It is not their duty to supervise the demolition of buildings, nor to supervise the construction of buildings. They are there to see whether violations of the law are committed.

USE OF SIDEWALK SHEDS FOR STORAGE

It has been mentioned that sidewalk sheds are sometimes used as storage sheds. There is no objection, as far as the building bureau is concerned, to the use of a sidewalk shed as a storage shed, provided it is built accordingly, because these sheds are what we call protection sheds. They are not supposed to have any materials on top. The fact is that in demolition (and it never fails) the con-

tractor will put material on his shed, anticipating probably that the next truck will be along in a short time, and that it will be picked up—and something happens.

The truck does not come, the men who are engaged in demolition work (who are employed for their brawn, not their brains) keep on piling the material on, because the contractor cannot have a superintendent or a foreman on every floor or all over the building.

COLLAPSE OF A SHED IN WALL STREET

We had one of these cases last Spring in the Wall street section where a sidewalk shed was used for the purpose of storage—and the men kept piling on material. Shortly after 5 o'clock it collapsed. Wall street at 5 o'clock is a pretty quiet and dead street. If it had happened about an hour earlier, the casualty list would have been considerably larger. So it is imperative that if a contractor wants to use a sidewalk shed for the storage of materials, it must be built as substantial as a floor that is designed to carry a certain weight.

We find another thing. Sometimes the demolition man will cantilever his shed, because it extends from the curb to the building line, so as to cover every part. We get the old style buildings that set back 6 feet to 10 feet from the building line and have an areaway. He will place the sill-plate outside of the areaway and cantilever over the spot. The result is that the cantilever end is overloaded. What happens? You know. It loses its balance. The sidewalk shed comes down.

We are happy to say that we have had few sidewalk shed accidents.

VIOLATIONS OF BUILDING DEPARTMENT RULES

The next thing we require is the demolition of a building, story by story. That is a section of the code, embodied in 1906, and it has been carried right along—removing the building story by story. As the material is taken down from the wall to be lowered to the ground, it is not to be piled up on the floor for the reason that, particularly in non-fireproof buildings, everything is torn out of the building to be used in the ordinary way. Yet they take down the stuff and they do pile it on the floor, letting it accumulate. Under ordinary conditions the floor might stand up. The men quit for the night. A storm comes up, and with the addition of the weight of rain or snow, or a wind pressure, the floor gives way.

I had occasion today to go into a building that is in course of alteration, a considerable part of which is being demolished. I found a man who had taken down a brownstone lintel, probably 5 feet wide by 12 inches high, and 12 inches thick. Instead of lowering the lintel to the street the men had put the lintel on a floor of the building, and a laborer with a sledge hammer was pounding it into pieces. The wooden floor, with a plaster ceiling underneath, was liable to drop at any moment—and the constructing demolition man was standing alongside giving instructions! The reason for that performance was that it was easier to send the material down the chute than to lower the lintel. No attention was paid to what might happen to the ceiling underneath, which had not yet been stripped.

When I got on the sidewalk and talked to the demolition man, his answer was, "I have been in business for 15 years and I have never had anything happen to me."

"NO ACCIDENTS IN FIFTEEN YEARS"

I don't know why it is that almost all the demolition men I have argued with have told me they have been in business for 15 years. They must have all started about the same time.

However, an accident will illustrate how the 15-year period does not always work out. They were demolishing a building at 30th street and Fifth avenue last year, and, as I have said, the material is supposed to be lowered down. We found that the men working there would take bundles of lathes and bundles of flooring and drop them down two or three or four stories onto the sidewalk shed. I was watching this demolition, and I went over to the man who I thought was the demolition contractor, and I said, "Are you the demolition contractor here?" He said, "What do you

want?" I said, "The question I asked you is are you the demolition man?" He said, "Yes." I said, "Why do you allow your men to drop stuff out of the windows that should be lowered down?"

The same answer: "I have been in business for 15 years, and nothing has ever happened." Just then a fellow dropped down a piece of 2 x 4, which landed on a laborer's back.

I said, "My friend, you better start your 15-year period over again."

There is no excuse for these things. Why the men will take a risk for the purpose of saving is hard to explain.

CONTRACTORS AND WORKMEN HEEDLESS

If demolition is carried on as the building code requires it to be, and if the simple rules we require are followed, there will be little or no question about safety. We find, for instance, that in demolishing a brick wall, the laborers will pry it loose and topple over piers 3 to 4 feet wide, and probably 8 or 10 feet high—topple them over on the floor. For what reason? For none, except to save handling the brick twice. These things happen all the time.

When we find demolition work going on regardless of the safeguards required by law (we do not often take the step because it is a drastic measure) we serve a stop order on the contractor, and the minute that stop order is served, he cannot do anything more until he cleans up his building and complies with the law. If he does, he is immediately given a summons, and is taken before a city magistrate, and the magistrates do not hesitate to fine a man $250. For that amount a contractor can provide a great many temporary precautionary measures, even an ordinary sidewalk shed can often be built for that sum.

UNGUARDED FLOOR OPENINGS

But we find other weaknesses. They take out the stairs and leave the stairwells. They take out the elevator doors and leave the openings exposed—no barriers. They simply consider that they are progressing with their work, never thinking of the possibility of anything happening between 5 o'clock at night and 8 o'clock the next morning.

It is possible for a building in course of demolition to catch fire, just as it is for a building that is occupied. What is the result? Firemen go up to fight a fire. Where they expect to find safeguards they do not find them. They fall into stairwells or elevator shafts—to their deaths perhaps.

Now what I have mentioned constitute simple precautions. And simple precautions are overlooked elsewhere as well as on buildings that are being demolished.

LABOR DELEGATES LET THEIR MEN TAKE CHANCES

At no time have I found a deep interest on the part of the so-called labor delegates in calling our attention to what they might think an infraction of the law or a weakness. But in one case, three months ago, a delegate of a wreckers' union called us up and said, "There is a shed erected down here, and I will not let the men work on demolishing that building in the condition that shed is in." It took me 5 minutes to jump into a taxicab and run over. He was right. It was the flimsiest piece of work I ever saw, and they were demolishing a 6-story building. Naturally I stopped the work immediately, and had the shed properly reinforced.

The safety proposition is important to the man who is interested from the labor point of view in the men he represents. He should call to the attention of the responsible building department heads conditions that may not have been observed by the department inspector. I admit that our inspectors are not infallible. They may overlook a thing, sometimes, not intentionally, but it may appear to them: "Tomorrow the building will be down; let us pass it by." Suffice it to say that if any accident did happen and the shed erected was a faulty structure, the inspector would have a very hard row to hoe to prove that he had done his full duty.

SAFETY COMES BEFORE THE DOLLAR SIGN OF PROFIT

Our viewpoint is absolute safety. Not alone for the pedestrians but also for the men employed. We have the idea that it is better to be safe than to put the dollar sign of profit in front of the "Safety First" sign.

Statistics of Accidents in Construction and Demolition of Buildings

By Peter C. Spence, C. E.

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Proceedings of the American Society of Safety Engineers

A PROVISION in the labor law of the State of New York that "within 48 hours after the time of an accident, death or injury, a report thereof should be made to the Commissioner of Labor stating as fully as possible the cause of the death or injury, and the place where the injured person has been sent, with such other or further information relative thereto as may be required by the said commissioner, who may investigate the causes thereof and require such precautions to be taken as will prevent the recurrence of similar happenings," evidences the lawmakers' conviction that statistics are necessary for substantiating the present provisions and as a basis for enacting future laws or regulations.

From records thus obtained and from reports in awards of workmen's compensation it was seen that in the four years following October 1, 1910, there occurred 1,641 deaths in the building industry. Approximately four times as many were employed in manufacturing during the same period, yet the total number of deaths was but 1,825; moreover, this figure included 204 fatalities due to 3 large factory fires.

This startling comparison convinced the State Industrial Commission of the necessity for action if this experience was to be bettered, and as a result rules were promulgated for the construction, alteration, repair, painting, cleaning, pointing and demolition of buildings. Although it is conceded that exposure to the hazards of building and demolition is greater in New York City than in the remainder of the State, owing to the comparatively immense amount of construction work under way in normal times, the State rules do not apply to New York City, because local authorities have jurisdiction over the enforcement of the law in regard to building operations. Statistics afford a sound basis in the preparation of standard codes or for revising existing codes.

Protecting guards are installed, intelligently and effectively, not on the basis of somebody's guess that the equipment or hazard may cause an injury, but because experience has revealed that accidents happen from this or that equipment or have been caused by this or that hazard.

The results of statistics when presented to the employes in some sort of display form will accentuate the need for caution, good conduct and safe procedure. They will make plain the waste and loss of efficiency that accidents represent.

A uniform report should be used that will record all the particulars of the accident, and for that purpose the blanks furnished by the Workmen's Compensation Bureau of the Department of Labor are available.

The combined or accumulated experience of all engaged in the industry is necessary to determine the principal hazards and how such can be effectively guarded. Manufacturers of construction equipment will learn how to safeguard their product so as to eliminate or minimize the hazard. Guards built in the factory are far more satisfactory and generally give better results than the makeshifts installed in the field.

Statistics aid in determining the relation accidents bear to overtime work, labor unrest, "turnover" and different phases of construction work. When charted, their utility has been shown in locating the peaks determining the hours of the working day when accidents usually occur, bearing a relation to personal fatigue.

Compensation is awarded employes injured accidentally in the course of gainful employment, and who suffer such

DISTRIBUTION BY INDUSTRIES OF COMPENSATED ACCIDENTS IN STATE OF NEW YORK, IN YEAR ENDED JUNE 30, 1917.

INDUSTRY GROUPS	NUMBER OF COMPENSATED ACCIDENTS								
			Perm. Total		Perm. Partial			Temp. Total	In-def.
	Total	Fatals	Amp.	Other			Disfig.		
		10	25	29	30	35	80	60	98
Agriculture	53	1	..	..	3	3	..	46	..
Mining	288	16	..	3	21	10	..	238	..
Quarrying	286	20	..	..	15	18	..	233	..
Stone products	404	10	..	..	20	17	..	357	..
Clay products	188	5	..	..	12	6	..	165	..
Glass products	219	2	..	..	12	7	..	198	..
Ore reduction and smelting	341	14	..	..	15	15	..	297	..
Rolling mills & steel works	1671	41	..	..	117	67	..	1446	..
Metal goods	4784	32	..	..	581	185	..	3984	2
Machinery & instruments	4394	41	..	..	348	172	..	3831	2
Vehicles	1204	8	..	..	96	50	..	1050	..
Lumber and wood	2702	42	..	..	341	154	..	2164	1
Leather	1264	10	..	..	92	42	..	1120	..
Rubber & composition goods	314	5	1	..	34	15	..	259	..
Chemicals & allied products	1410	36	..	..	75	62	2	1233	2
Paper & paper products	1511	21	..	1	137	72	..	1280	..
Printing & publishing	869	4	..	..	83	31	..	749	2
Textiles	1253	14	..	1	133	48	1	1053	3
Clothing & furnishings	2211	9	..	..	45	69	..	2087	1
Foods, beverages & tobacco	2750	69	..	..	154	129	..	2397	1
Misc. manufactured products n. o. c.	194	11	..	1	19	4	..	158	1
Wrecking & moving	151	2	1	..	4	5	..	139	..
Grading, excavating & foundations	3065	103	..	1	114	149	..	2695	3
Erecting	4470	151	..	2	144	150	1	4017	5
Finishing, equipping & installing	1872	38	..	1	26	70	1	1736	..
Steam railroads	998	45	..	..	40	23	1	888	1
Electric railroads	1105	53	1	..	36	30	..	985	..
Cartage and storage	6476	160	..	1	129	178	3	6001	4
Stock yards	24	..	..	..	..	..	..	24	..
Transportation by water	5074	48	..	..	64	79	..	4883	..
Public utilities	876	31	..	..	23	26	..	796	..
Pipe lines	0	0	..	..	0	0	..	0	..
Trade	1691	36	..	..	80	64	..	1511	..
Service	1329	54	..	..	55	58	..	1161	1
Total	55441	1132	3	11	3068	2008	9	49181	29

EXPLANATION OF CODE NUMBERS, HEADING OF ABOVE TABLE:

10, Fatal. 25, Permanent Total (Amputation). 29, Permanent Total (Non-amputation). 30, Permanent Partial (Amputation). 35, Permanent Partial (Non-amputation). 80, Disfigurement. 60, Temporary Total. 98, Indefinite. (N. o. c. means not otherwise classified.)

diseases or infections naturally and unavoidably resulting therefrom.

Compensation is not awarded if the time lost be less than 14 days, but all accidents should be tabulated even though the time lost be less than 14 days, and, in fact, even if no immediate loss of time ensues. Infection might set in or later developments prove the accident to be more serious than at first supposed. Total disability means the loss of both hands, or both arms, or both feet, or both legs, or both eyes.

Permanent partial disability includes every accident less than total disability which results in the loss of, or in the permanent impairment of any function of the body.

Sunday is not considered a working day in figuring the days lost through accident. Calendar days can be converted into working days by multiplying by 6/7.

NUMBER OF COMPENSATED ACCIDENTS IN STATE OF NEW YORK IN YEAR ENDED JUNE 30, 1917

WRECKING AND MOVING

CAUSE	Total Deaths	Number of Compensated Accidents: Perm. Total Disability	Perm. Partial Disability	Temp. Total
Elevators (Car, struck by, elsewhere)	1	1	..	..
Construction Hoists and Elevators	1	..	..	1
Derricks and Jib Cranes				
Striking person	1	..	..	1
Falling	1	..	1	..
Machinery (Catching person)	1	..	1	..
Load (Struck by, swinging)	1	..	..	1
Load (Struck by, lowering or raising)	2	..	..	2
Load falling (Breaking hook)	1	..	..	1
Other	1	..	..	1
Blocks and Tackles, Windlasses, Capstans and Winches (not otherwise classified)	1	1	..	..
Struck by (while standing or walking on tracks) Cars and Engines	1	..	..	1
Falls from Animal-Drawn Vehicles	2	..	..	2
Struck by Animal-Drawn Vehicles	1	..	..	1
Premature or Delayed Shot (Explosives, blasting)	1	1	..	..
Windy shot (Explosives, blasting)	2	..	1	1
Falls from				
Buildings in Construction or Demolition	15	..	1	14
Cranes, Derricks and Hoists in Erecting or Rigging	1	..	..	1
Floors, Temporary	1	..	..	1
Roofs	1	..	..	1
Runways, Balconies and Platforms	5	..	..	5
Scaffolds and Stagings (Breaking or Slipping)	2	..	1	1
Scaffolds and Stagings (Breaking of Tackles and Supports)	1	..	..	1
Scaffolds and Stagings (Other)	1	..	..	1
Fall from Elevations	2	..	..	2
Fall into Floor Openings (not Elevator Shafts)	2	..	..	2
Fall into Other Openings	1	..	..	1
Fall on Level				
Slipping of Foot	4	..	..	4
Slipping or Breaking of Tools	1	..	..	1
Stumbling	4	..	..	4
Stepping on Nails	6	..	..	6
Striking against Nails	2	..	..	2
Falling Objects				
Collapse of Buildings and Walls	6	..	..	6
Collapse of Stored or Piled Up Material	1	..	..	1
Collapse (Other)	1	..	..	1
Cave-in of Open Excavations	1	..	..	1
From Buildings	5	..	..	5
From Other Elevations	4	..	..	4
Into Other Excavations	1	..	..	1
Objects Tipping Over (except Vehicles)	2	..	..	2
Other	11	..	1	10
Heavy Objects				
Objects Dropped While Being Handled	20	..	2	18
Objects Falling from Load or Pile	3	..	..	3
Caught or Squeezed between Object Handled and Other Object	6	..	..	6
Strain in Lifting	4	..	..	4
Sharp Objects				
Sheet Metal	2	..	..	2
Objects with Protruding Nails	1	..	..	1
Other (except Tools)	1	..	..	1
Hand Trucks, Carts and Wheelbarrows	1	..	..	1

NUMBER OF COMPENSATED ACCIDENTS IN STATE OF NEW YORK IN YEAR ENDED JUNE 30, 1917 (Continued.)

WRECKING AND MOVING

CAUSE	Total Deaths	Number of Compensated Accidents: Perm. Total Disability	Perm. Partial Disability	Temp. Total
Hand Tools				
Breaking or Coming Apart of Tool	1	..	..	1
Flying Pieces Set in Motion by Tool	2	..	..	2
Other	4	..	..	4
Runaway (Horses, etc.)	1	..	..	1
Flying Particles, n. o. c.	5	..	1	4
Miscellaneous	1	..	..	1
Total	151	3	9	139
Year ended June 30, 1916	165	6	18	141

In determining the daily wage for the purpose of compensation, the weekly stipend should be divided by 5½ where Saturday is a half holiday.

In order to express the total volume of accidents it is customary to estimate on the time lost, in preference to wage loss, since the latter figure varies considerably.

Accident frequency is obtained by dividing the number of lost time accidents by the actual number of 1,000 man-hour units of exposure for a given period. The quotient is the accident frequency rate. Taken alone this figure may prove a misleading index. After applying safeguards and regulating the process of building or demolition, the first accident records to disappear are those of short disability, reducing the frequency. A single death will produce greater economic loss to the victim's family and to the community at large than many hundred minor temporary disabilities. Frequency rates place the man who is permanently disabled on a par with one receiving a torn thumbnail. In order to compare the relative seriousness of different accidents a severity rate is used.

Accident severity expresses the time lost in working days, for each 1,000 man-hour units of exposure, for a given period. A disability of one calendar week represents the same severity of injury whatever the length of the working day or working week. Permanent total disability, equally with death, entails time lost equivalent to the full working life expectancy of the person injured. Against giving it the same weight in the table as death is the argument that a permanent total disability causes a greater economic burden upon the sufferer's family and upon the community than a death. But it cannot reasonably be said that an accident resulting in permanent total disability indicates a greater hazard than one resulting in death.

Permanent partial disabilities are usually rated in percentages of permanent total disabilities. To each fatality and disability must be assigned arbitrary figures representing an equivalent number of days lost.

Six States and the Federal Government provide death benefits until the death or re-marriage of the widow.

For each injury assign the value in days lost as indicated in the table and divide the total of the days lost by the actual number of man-hour units for the given period, the quotient being the actual accident severity rate.

An accident tabulation without the frequency and severity rates or the man-hour exposure given for calculation is of little comparative value. It will be understood that more accidents could be reported this year than last and yet if the man-hour exposure exceeded the previous year, the frequency and severity rates would be less. Conversely fewer acci-

dents in this year's tabulation than in the year previous could have a higher ratio of frequency and severity if the man-hour exposure was much smaller than in the comparative year.

In the report of the Department of Labor and Industry of Pennsylvania, the accidents have been combined to show the total severity of each cause (Building and Contracting) by assigning to each kind of disability the severity weight listed at the top of the table. A fatality is valued at 150 times a temporary compensable case.

The Making of a Safety Standard

By Dr. Clifford B. Connelley

Commissioner, Department of Labor and Industry, Pennsylvania

Proceedings of the International Association of Industrial Accident Boards and Commissions

THE making of a safety standard, or a code of rules governing industrial safety, is more than a one-man job. It represents the co-operative interest and experience of

1. The worker or wage earner,
2. The employer,
3. The engineer or technical expert,
4. The manufacturer,
5. The State,
6. The insurance carrier, and
7. The public.

It affects the life and health of the worker, the pocketbook of the employer, the ingenuity of the engineer, the skill of the manufacturer, the law enforcement power of the State, the field of business for the insurance carrier and the welfare of the community. Every interest that can contribute towards the protection of the life, health, safety and morals of the worker in industry is concerned in the making of a safety standard.

There are two possible viewpoints in drafting a code of safety rules. One is that a safety standard is the ultimate goal to be reached—that it is the "bar of platinum" preserved and guarded under ideal conditions, to which everything must be made to conform. The other view is that a standard is a progressive growth, measured by the best experience and practice of our constantly developing industries. The better training of the worker, the achievements of the inventor, the keener sense of responsibility of the employer and of the State, the closer and fuller organization of the employers and employes and better understanding between them, and the larger interest of the public are the forward steps in the march of industry. These must be written into the code of rules, according to this view, from time to time. This is, of course, the viewpoint of the State of Pennsylvania in the safety standards issued by the Industrial Board. The inspector, under this view, has not the right of private interpretation, but must confine his instructions to the standard as written.

To illustrate what is meant by making a safety standard it may be to the point to take a specific standard and trace its development. The safety standard applying to elevators may serve our purpose. The duty of initiating the formulation of a standard rests with the Safety Standards Committee of the Industrial Board. In the case of the Elevator Standard the task was to revise the original draft, which had been in effect for several years. The method of procedure in revision is not unlike writing the original draft, except that experience makes possible a more finished document, consistent with up-to-date industrial conditions.

The first step was to secure a committee, representative of all interests in the making of an elevator, the installation of it, the owner, the user and the operator. The plan was to have as small a committee as practicable in order to facili-

tate the work. This committee was to discuss the standard in effect with the view of suggesting changes where necessary. The interest was so keen that the attendance was too large to attempt the work at the first meeting. (A significant fact in this connection is that the State does not pay a single penny of the expenses of those who do this work.) By vote it was decided that the chair appoint a subcommittee of ten and refer the rewriting of the standard to that body, with the idea that the re-drafted document would be submitted to the larger group at a later date. The subcommittee of ten spent six full days in considering the standard before submitting it to the general committee.

One hundred and fifteen pages of typewritten copy was returned to the subcommittee, representing the criticism of the general committee. It was then the task of the subcommittee to digest that material and incorporate it into another draft, to become the tentative code for public hearings. Public hearings involve a campaign of publicity in newspapers, trade journals and the circularization of all persons in the State who may be affected by any provision of the standard. Meetings were scheduled in convenient parts of the State. Stenographic records were made of all criticisms offered at each meeting and made available for the subcommittee of ten, which was called together again to make a final draft of the standard. The final draft when completed was submitted at a regular meeting of the Industrial Board for adoption. It was then distributed to all interested, free of charge.

In addition to a general revision of all codes now in operation*, the Department of Labor and Industry, through its regular channels, has been engaged recently and is still engaged in formulating new codes, among them the following: Head and Eye Protection, Sanitation, Laundries, Housing, Refrigeration.

STANDARDIZATION OF STANDARDS

Pennsylvania favors standardization and is represented on the National Committee by the Commissioner of Labor and Industry. It is not the purpose of the State, however, to give up the work of drafting standards or lose its identity in the bigger movement. The best standards for Pennsylvania will always bear the "Made in Pennsylvania" stamp. There is ever the danger in pooling interests of losing what might be termed the "personal touch." A national body is sure to become a group of experts, in which the technical side will be emphasized, not intentionally, of course, at the expense of the human interest. Somebody has said that standards to be of the maximum value must be 15 per cent technical and 85 per cent human. The technical or legal must never replace the common-sense viewpoint—that is one of the best features of the Pennsylvania standards.

By this we do not mean that standard making must not rise above the "rule of thumb" method. The technical spirit and the legal thought must be incorporated, but only in as far as the industry in which the standard is to apply is educated to the safety idea. Nothing weakens law or rulings quite so much as making enforcement or compliance unduly difficult. Provision should be made, therefore, to have the standards as simple as possible and by constant checking and rechecking, adding and detracting, keep them within the range of those for whom they were intended. It should not be necessary to employ a lawyer to interpret a safety standard, nor should the specifications be such that only an engineer can understand them.

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* Pennsylvania Safety Standards that have been in operation for a considerable period:

Power Transmission, Standard Railings and Toe Boards, Machine Tools, Boilers, Stationary Steam Engines, Ladders, Lighting, Elevators, Electric Cranes, Scaffolding, Compressed Air, Forging and Stamping, Polishing and Grinding, Woodworking, Foundries, Fire Prevention, Sanitary, Bake Shops, Canneries, Cereal Mills, Motion Pictures, Shop Clothing, Printing, Explosives, Nitro Amido, Lead Corroding, Paint Grinding, Dry Colors, Plant Railroads.

EDITORIAL

THE N. F. P. A. MEETING IN SAN FRANCISCO

IT was the Ottawa meeting that broke the regularity of the New York and Chicago alternations of the National Fire Protection Association's annual meetings and the success of that departure from an established custom led to the decision that, while Chicago should keep its meeting in alternate years on account of the interest attached to the Underwriters' Laboratories, New York should give way to other sections where either stimulation in matters of fire prevention is needed or marked support of the association's work merits recognition.

Jay W. Stevens did a lot to bring about the choice of San Francisco. He secured new members in goodly number, he enthused the Chicago meeting last year by talks and pictures, and when Secretary Wentworth made his tour of the Pacific States he found great interest everywhere in the cause he preached.

San Francisco is a good choice. Attendance means time and money for many far eastern members, but sectionalism must not be permitted to exist in these United States. If unanimity of national thought is to be maintained it must be by the journeying of American citizens from one end to the other of the continent. They must not only "See America First," but *know* their country and their fellow-countrymen.

Distance is nothing in business if one knows the man at the other end of the mail route. Differences cannot exist when personal friendships exist. In all phases of the work of fire prevention and accident prevention uniform standards and practices are best secured through the personal contact of those interested.

It is to be hoped, therefore, that the coming meeting will do much to solidify old friendships and promote new friendliness. It cannot fail to teach much to those who—perhaps, for the first time—are to visit the great States on the Western Sea.

FIRE PROTECTION SCORES A VICTORY

FOLLOWING the destructive Melvin apartment house fire in Boston in 1914, with its attendant loss of life, the Massachusetts legislature proceeded to provide locks and bolts for the "stable door" by enacting that certain portions of certain apartment houses should have automatic sprinkler protection.

The bill was strenuously opposed at the time of its passage by the real estate interests, mainly on the ground of expense.

The law, however, was not enforced. In fact no attempt was made at enforcement during the war period, but late in 1920, the control of the Boston city government having suffered a change, notice of future enforcement was given.

Thereupon the "interests" involved began a campaign of obstructive delay, alleging inability of the sprinkler companies to make contracts for installations, coupled with a threat to advance rents, and further seeking cover under the plea that since compliance was impossible an attempt at enforcement would bring about many evictions.

The legislature yielded so far as to provide for a stay of enforcement until April 1, 1921, subject to the approval of the present mayor of Boston, which was not given.

Then a bill was introduced repeal-

ing the original act entirely, but it failed to pass, whereupon a new bill was passed giving an option of automatic alarms.

There was some cleverness in the suggested option, since, on the face, automatic alarms, while less efficient by far, are of much service and apparently less expensive, at least as regards primary cost of installation. Mention was carefully avoided of the expense of the necessary electric service, which, in a majority of cases, would be quite prohibitive, requiring costly leases of private wires or even more costly conduit extensions. Such a law, however, would have opened up many avenues for obstructive delay.

Apparently, some one "saw the light," for, following Mayor Peters' refusal to approve, and a somewhat similar attitude on the part of Governor Cox, the Senate recalled the measure and the bill failed, leaving the unchanged original act to be enforced, for at least two years to come.

In this instance, at least, common sense and an enlightened policy has won over influential opposition. And the far-seeing and public-spirited citizens who championed the original measure and later defended it are to be congratulated.

USHERETTES AND FIRE

NOT even a brave and smoke-eating fire marshal can withstand the fury of an angry woman more successfully than did Elijah of old, and possibly the fire sovereigns of the various States will follow the example of valorous discretion set by the ancient prophet, and take to the woods seeking the shade of a sheltering juniper tree, in order to escape the wrath of female theater ushers.

For, when the news spreads along the Rialtos of American cities that 85% of the fire marshals of the country—practical and ungallant crustaceans—have condemned the hiring of women ushers in theaters, there will be a speedy hegira of helmets and a bursting of silver buttons as the marshals retreat in confusion before the bombardment of powder-puffs and the onrushing phalanx of enraged hat-pins.

A questionnaire, addressed to the various fire marshals of the country, inquiring their opinions as to the suitability of women ushers in theaters, failed to produce even one approving reply. Eighty-five per cent of all answers were flatly opposed to the practice, while the remaining 15% evidenced a masculine tendency—where women are concerned—to dodge the issue.

The chief point of condemnation against usherettes or usherines is not that they cannot plant a 120-pound man squarely behind the mountainous shoulders of a 280-pound woman with the same skill as a male usher, but that, as one marshal stated: "Women show less judgment and are not so reliable in an emergency," or, according to another view: "Women would not be of any value in case of trouble with a crowd."

Fire marshals as a body are not given to levity, and the fact that they have taken under consideration a subject probably never even heeded by the average theater-goer, is an indication of the vigilance at work in the interest of the public.

Already the fire department of Chicago has declared itself as opposed to the employing of women as ushers in theaters, and the daily press has given considerable publicity to the movement, with the probable result that the attractive little maiden who handed out a smile with every program will soon be numbered among the lost arts.

It is to be hoped, if a change is to be made in the ushering system, that the theaters and public halls will hire men of such age, size and personality that they will be able, in a fire emergency, to properly handle an excited audience. If the theaters merely replace the present demure and dainty maids with gum-chewing, nicotine-stained, fresh Buttons, there are many theater-goers who would prefer to trust their lives to the judgment of faithful and conscientious girls whose records in other vocations, as telephone workers, nurses, elevator operators, etc., have shown them to possess all the qualities of true heroines.

Pneumatic Systems for Removal of Dust

By F. C. Allen, Jr.

of the firm of Allen & Billmyre, New York

THE need for a simple and economical means of removing and conveying dust and other materials is obvious. Each day there are moved tremendous quantities of grain, sand, coal, coffee, ashes, flour, etc. Much of the packing, loading, and unloading of such materials can be done by means of moving air. Again, we have all kinds and varieties of dust and dirt to be removed from buildings of all classes.

The word "dust" may mean material of any kind in a dry and more or less pulverized state.

Out-of-doors, the percentage of dust in the air is usually small, but within doors the dust which enters or is created there has little chance of escape.

DUST—NOXIOUS, DANGEROUS, VALUABLE

The removal of this dust is imperative for different reasons in different kinds of buildings. The sanitary reason is almost always to be considered and is of the utmost importance. But there are frequently other reasons, particularly in manufacturing establishments. Here we have not only ordinary dust, but frequently other forms of dust or lint or refuse matter which is created directly or indirectly by the product in process of manufacture.

For example, the dust in certain manufacturing plants may be of such nature and in such quantity that it interferes with the process of manufacture. It may, and frequently does, accumulate in such quantities as to interfere with the proper operation of machinery.

Again, the dust may be of value, such as gold or silver or other metallic dust, which it is important not to remove, but to collect and save.

Again, it may be injurious to the product being manufactured.

Again, it may constitute a fire hazard, as much dust is so easily inflammable as to be almost explosive.

Again, it may be of a poisonous nature, making its removal imperative.

PROBLEMS THAT MUST BE SOLVED

As illustrations of the above we can readily see that—

1. In a room where a large number of weaving looms are operated the dust and lint gathers in such quantities that the machines must be frequently stopped and cleaned.
2. In a mint or goldsmith's establishment the dust should be removed and saved.
3. In a plant making fine silk or paper goods the dust and dirty lint must be kept away from the product being manufactured.
4. In a flour mill the dust cannot be allowed to accumulate because of the danger of dust explosions.
5. In a lead factory the dust is poisonous.

As to the means to be employed for the removal of dust, the choice is limited:

1. It may be swept with brooms, etc.
2. It may be washed out with a stream of water.
3. It may be blown by a blast of air (compressed air).
4. It may be drawn into a duct or conduit by an inflowing air current or suction.

In the first method much of the dust and other material is swished into the air, settles in another place and is not removed.

The second method is seldom practicable because water injures the machinery, product or both.

The third method merely moves the material from one place to another and removes none of it.

The fourth method both moves and removes without spilling or scattering, and furthermore makes it possible to collect and retain the material which is to be reclaimed or destroyed, as the case may be. This method is quite obviously the cor-

rect and ideal solution of the problem, in all cases where its application is feasible.

All dust in buildings is either in a state of suspension in the air or else has settled upon the floor, ledges, walls, and other interior surfaces. In other words, we have floating dust and dust which has settled. Experience has shown that a pneumatic dust-removal system properly designed for the removal of floating dust will not remove dust which has settled. The reverse is also true, so that there have naturally evolved two separate and distinct schools of engineering for the development of the two different kinds of systems.

DUST REMOVAL AND VENTILATION

Dust which is suspended or floating in air may be removed by any system which will remove the air in which it floats. Therefore, this method is closely allied with that of artificial ventilation. As a matter of fact, many ventilating systems are designed for the dual purpose of removing air and the dust suspended in air. The conditions are frequently such that special systems are installed for the sole purpose of dust removal, the removal of the air being merely incidental. Again, this same class of apparatus is used for the removal of smoke or fumes, all of these things really coming under the head of ventilation.

The removal of dust, lint, and other litter which has settled on floors and other interior surfaces is a considerably more difficult problem. In the first place, it is the heavier dust particles which settle first; in the second place, there is frequently collected on the floor not only dust, but much larger and heavier material; and in the third place, it is more difficult so to apply the air current that it will remove material from these interior surfaces.

CONCERNING VELOCITY OF MOVING AIR

If we observe the action of the wind in an open field, we find that a gentle breeze will move light material, such as fine dust, leaves, and pieces of paper. If the breeze changes to a strong gale, we find that a heavier grade of dust is moved and also materials of larger size and weight. If the gale increases to the intensity of a hurricane or cyclone, we find that this moving air has the power of moving almost anything in its path, including fences, trees, houses, etc.

The only change has been in the velocity of the air or wind, and similarly we find that in the application of air for the removal of dust in buildings, the greater the velocity, the greater the carrying power.

The manner in which this principle is applied for the removal of dust in buildings varies considerably in different kinds of buildings and for different kinds of material to be removed. The force of the moving air, however, is usually applied by means of a hose or other flexible conduit, into which there is flowing a current of air at exceedingly high velocity. At the end of the hose there is sometimes placed a nozzle to distribute the air current over a larger area. To be effective, the hose or nozzle must be moved about so that the air current will strike the dust and other material to be removed. After once entering the hose it is carried along through the hose or piping until it reaches the dust collector, which retains the dust and other solid matter, but permits the air to pass through.

LIMITATIONS OF "VACUUM CLEANERS"

A more familiar application of this same general principle is the ordinary vacuum cleaner. It is obvious, however, that the capacity of a vacuum cleaner is not sufficiently large to undertake the removal of dust and litter in factories where the nature and quantity of the material easily present an entirely different problem.

I would like to say a word about the vacuum cleaner. In the first place it is improperly named, the vacuum does not clean. It is the moving air which carries dust with it, therefore a better name would be air cleaner. The partial vacuum is created merely for the purpose of causing the inflow or current of air. In the second place, many forms of apparatus have been placed upon the market bearing the name vacuum cleaner which have not been designed to utilize properly the conveying power of air. Many of them are of inferior mechanical design and

many are extremely inefficient. It is unfortunate that, generally speaking, the design and construction of this kind of apparatus has not been under the supervision of high-grade engineers, for the result has been that many persons have gained a wrong impression of the possibilities of utilizing this principle, because they have purchased apparatus which was improperly designed or improperly constructed.

As the industry is new, it is only natural that there should be many machines of an experimental type.

It is also regrettable that in some cases ordinary vacuum cleaning machines have been sold to manufacturing establishments upon the representation that they are suitable for the work in hand, and they have been found of inefficient capacity for the work required.

SCIENTIFIC PNEUMATIC DUST REMOVAL

During the past few years the progress made in the development of pneumatic dust-removal systems for manufacturing establishments has been rapid. Almost every manufacturer has a dust-removal problem of some sort, and usually the problem can be solved in this manner.

In addition to the removal of dust and lint from floors, there are many other applications of this same simple principle, such as the conveying of material from one part of the building to another, so that the possibilities and variations for different classes of work are almost unlimited.

The principle involved in all of these systems is merely the application of the simple law of nature that moving air has the power of conveying solid matter. In the working out of suitable apparatus there are, however, many difficult mechanical problems which vary with different classes of work. It is obvious that there are many different ways of creating an air current, many different ways of separating solid matter from air, and many different sizes and kinds of hose, piping, nozzles, etc. In any given system all of the elemental parts must operate harmoniously to form the complete system, all elemental parts must be of proper proportions and design for the particular work to be done. A system suitable for handling one kind of material would be of entirely different design from a system for handling some other material. Again, in one plant there may be a bushel or two of material to be handled in a day, whereas in another plant there may be several carloads.

A DISTINCT BRANCH OF ENGINEERING

We are continually finding new problems and new applications. In fact, the necessity for properly developing such apparatus has created a new and distinct branch of engineering—that of scientific pneumatic dust and litter removal.

Coal Mine Fatalities Diminishing

Year	Production (Short tons)	Employed	Killed	Rate per 1,000 Employes	Rate per 1,000 300-day Workers	Killed per million tons	Production per death (Short tons)
1907	480,363,424	680,492	3,242	4.76	6.19	6.78	147,407
1908	415,842,698	690,438	2,445	3.54	5.45	5.97	167,407
1909	460,814,616	666,552	2,642	3.96	...	5.73	174,416
1910	501,596,378	725,030	2,821	3.89	5.31	5.62	177,808
1911	496,371,126	728,348	2,656	3.65	4.97	5.35	186,887
1912	534,466,580	722,662	2,419	3.35	4.46	4.53	220,945
1913	570,048,125	747,644	2,785	3.73	4.70	4.89	204,685
1914	513,525,477	763,185	2,454	3.22	4.66	4.78	209,261
1915	531,619,487	734,008	2,269	3.09	4.44	4.27	234,297
1916	590,098,175	720,971	2,226	3.09	3.93	3.77	265,094
1907	651,402,374	757,317	2,696	3.56	4.25	4.14	241,618
1918	678,211,904	762,426	2,580	3.38	3.94	3.80	262,873
1919	546,155,000	*765,000	2,317	*3.03	...	4.24	235,700
1920	645,663,000	*775,000	2,260	*3.00	...	3.50	285,700

*Estimated.

From the Mining Congress Journal

The New York Fire Department's View on Gas Control at Fires

IN another column may be found a report of action taken by the American Society of Safety Engineers with regard to the securing of legislation to compel the installation of means of shutting off the flow of gas in case of fire. In connection with this question SAFETY ENGINEERING requested the opinion of the Chief of the Fire Department of the City of New York. The following reply has been received from Chief Kenlon:

A VERY MUCH NEEDED REFORM

"Replying to SAFETY ENGINEERING'S letter of May 10, enclosing copy of a letter written by John H. Derby, member of the Committee of the American Society of Safety Engineers, to J. Albert Robinson, Chairman of the Committee on Fire Protection, respecting improved means for controlling the supply of illuminating gas to buildings by members of fire departments and insurance patrols, I would say, from the fire fighter's standpoint, that this is a very much needed reform.

DEATHS OF FIREMEN, LOSS OF PROPERTY

"Usually it takes from a half hour to three, four or five hours—in some cases until a fire is extinguished in a building—to shut off the supply of illuminating gas. This has resulted at times in the deaths of firemen. It has also caused considerable loss of property, because of the inability of members of the fire department to penetrate to the seat of the fire on account of escaping gas.

DIFFICULT NOW TO LOCATE VALVES

"In winter, when the streets are covered with snow and ice, it is often impossible to locate the controlling device placed in the street. At other times the surface of the street is covered with water, making it just as difficult to locate the stop valve in the street. Very often, when a street is re-paved, the valves are not properly set; in fact, they are sometimes covered over with paving so that there is no possible chance of locating the controlling device.

NEED FOR IMPROVED DEVICES

"I am in favor of installing an improved device that can be operated instantly by the officers of the fire department or the officers of the insurance patrol. This would eliminate a great deal of suffering and sickness on the part of the firemen and would advance the science of fire fighting because of the promptness and confidence with which firemen could enter buildings attacked by fire."

Safety in Driving Automobiles

THE safest automobile driver is one who knows his machine. Automobile knowledge is imparted, elaborately and concisely, in a book published recently by the Henlay Publishing Company, New York, entitled "Questions and Answers Relating to Modern Automobile Design, Construction, Driving and Repair." It is a practical treatise consisting of 39 lessons in the form of questions and answers, written with special reference to the requirements of the non-technical reader.

The book is brought down to date, including all the latest developments in automobile construction, electric starting, lighting systems, etc. Its cost is $2.50, a small price to pay for the prevention of many troubles for which ignorance is responsible, not to mention the possibility of preventing disabling or fatal injuries.

Safety News and Comment

National Safety Congress

THE dates of the 1921 Congress of the National Safety Council have been fixed as September 26 to 30 and the city is Boston. All of the sessions will be held in the State House on Beacon Hill. As headquarters will also be established here, there may be no "official hotel." It is planned to hold the annual dinner at Nantasket Beach and tickets will include the boat ride in both directions.

A Safety Exhibit at Boston?

BUELL W. NUTT, acting as president of the Safety Appliances Manufacturers' & Dealers' Association, has sent out the following letter for the purpose of determining whether it would be advisable to continue the long established practice of having a commercial exhibit in connection with the annual Safety Congress of the National Safety Council:

As you are doubtless aware, the annual meeting of the Safety Council this fall is to be held in Boston. In the past, arrangements for the exhibit have been made by the Council, but due to a number of different reasons the Council this year has decided not to conduct such an exhibit.

The writer, who was appointed chairman of the exhibit committee at the first of this year, was advised, however, by the Executive Committee that it would sanction the manufacturers holding an exhibit of their own as an adjunct to the Council's convention, and, while the Council would in no way be responsible for the finances of such an exhibit should it be held, it would give the exhibit its moral support, and allow it to be advertised as part of the annual meeting of the Council, merely requesting that the plans of the manufacturers be submitted to the Council when finally made, so that it might approve them.

It is the opinion of the writer, and also of a number of other safety device manufacturers with whom he has talked recently, that it would be a very serious mistake for us to abandon the exhibit feature of the annual meeting of the Council. This meeting provides the best opportunity that we have of coming in contact with the safety men of the country, and a number have stated that should there be no general exhibit of safety supplies, they, as individuals, expected to take an exhibit of materials, and if no better arrangements were provided, would display in a sample room at one of the hotels.

I believe, therefore, that there are enough safety device dealers who are interested to have at least a small exhibit, and I am writing to find out whether your company is one of this class who will join in putting on such an exhibit, the cost of which would be charged pro rata to those exhibiting.

The replies to this letter will indicate what kind of an exhibit can be staged. If a large number respond, a large public hall may be secured, or, if the response is smaller, it may be possible to secure the ballroom in one of the hotels; and in case there should not be enough to even fill up such a space, then some arrangement will be made to try to secure, if possible, a number of large sample rooms in one of the centrally located hotels at which individuals, as a group, may display their material, each concern arranging to take one room.

If the responses to the letter warrant it, the writer will make a trip to Boston and get information as to what spaces are available, the cost, location and other information that may be needed, and, after his return to Cleveland, will call a meeting of those who have agreed to exhibit, so that the facts may be put before them and final action taken.

The Safety Appliances Manufacturers' and Dealers' Association, which has been inoperative for some months, still has a small sum in its treasury which could be used to help defray the expense of the necessary preliminary work.

Will you please answer this letter at once, so that the information may be available immediately, as it is necessary that some action be taken in securing a hall at once, or we may find that there is absolutely no space which can be secured.

I have not taken the above action entirely on my own initiative, but have consulted with a number of other interested safety device dealers, who have urged upon me this method of taking care of the exhibit this year.

Mr. Nutt's action places the question squarely before the manufacturers of safety devices and materials. It will enable them to do their own deciding as to whether or not this commercial exhibit is desired.

Much will depend upon the location of the exhibit and the consequent extent to which it will be visited by the delegates. A low price for the space will also be necessary this year.

Heating and Ventilating Shows, June

TWO exhibits of industrial importance are to be held in the Irving Place Showroom of The New York Edison Company in June. The first will be devoted to electric heating and will be given during the week of June 6-11. For the week beginning June 20, a demonstration of electrically operated ventilating equipment is scheduled.

Plans for the heating show are well advanced, and practically all of the electrical appliances for industrial and domestic heating which have been perfected during the past five or ten years will be exhibited. Forty-one manufacturers have accepted the Edison Company's invitation to take part and at least 100 different applications of electric heat will be shown. Cartridge units, tubular heaters, soldering irons, capping tools and branding irons, apparatus for candy makers and for use in shoe factories, printing plants and other industries will be exhibited and demonstrated. Among the domestic applications of electric heat will be ovens and ranges and other cooking equipment, laundry apparatus, and heating appliances for bed rooms or bath rooms.

The ventilating display will include air conditioning equipment such as humidifiers and apparatus for temperature control and various types of fans for home, office, and factory. The importance of ventilation and temperature control is now recognized as having an important bearing on production, and is receiving careful study by industrial managers. A conference of industrial and ventilating engineers will probably be held during the week. Each show will continue one week and will be free to the public.

Mines Bureau Tests Safety Lamps

AFTER testing brass, copper, and steel gauzes used in miners' flame safety lamps for relative safety, the Bureau of Mines approves different materials for different conditions, and says that "The safest lamp tested was the double-gauze bonneted lamp." The full report may be obtained from the Bureau of Mines (Technical Paper 228).

Hollow Tile and Housing

ADDRESSING the Building Officials' Conference in Cleveland, on April 27, Mr. Charles C. Crockatt, chief engineer of the Hollow Building Tile Association, said that the manufacturers of hollow tile realized that the building officials have the greatest interest in the public health and safety of the public, coupled with good sound engineering practice and that they have placed restrictions on hollow tile only where in their opinion it was to the public interest to do so. Mr. Crockatt added:

We realize that there are limitations to all things, and it is the policy of the Hollow Building Tile Association to recommend the use of our material only in places where it is best fitted. The association is ready at all times to work with the building officials on any hollow tile problem which they may have. On the other hand, I feel that every citizen is entitled to a choice of materials where such materials comply with sound engineering practice and protect the public health and safety of the community.

We are continually studying our material with the hope of improving it and of finding new uses for it. At the present time we are supporting two scholarships at the Bureau of Standards in Washington, studying the fire resisting qualities of hollow tile. These two men are devoting all of their time to this important work, and we hope that as a result of this study we shall be able to offer the building public a material that is superior to that which is now manufactured.

The preparation of a building code is a big job, and it cannot be properly done in a few weeks because due consideration must be given to occupancy, available and future materials, zones or districts, in addition to engineering standards.

Some municipalities having old and antiquated building codes do not permit of an economical use of hollow tile, particularly in residence and apartment house construction. For instance, just last week, in a city in Kentucky, I ran across a requirement of 16" for hollow tile walls for the first story in residences, and 12" for the second story. In talking to the fire chief, who was also the building inspector, we were able to convince him that a change in their code was necessary in order to permit the erection of dwellings for less money and at the same time safely. This same opportunity exists in hundreds of other municipalities throughout the country.

Our recommendation for the thickness of hollow tile walls is as follows:

The minimum allowable thickness of all bearing, division, party, curtain or panel enclosures, walls of hollow tile shall be as follows:

1. Within the fire limits, the minimum thickness for all bearing party or enclosure walls

shall be the same as provided for brick walls.

2. Outside the fire limits the minimum thickness shall be as follows:

a. For a 1-story building, 6 inches.

b. For a 2-story building, first story 8 inches, second story 8 inches.

c. For a 3-story building, first story 10 inches, second story 8 inches, third story 8 inches.

d. For a 4-story building, first story 12 inches, second story 10 inches, third story 8 inches, fourth story 8 inches.

e. For a 5-story building, first story 12 inches, second story 10 inches, third story 10 inches, fourth story 8 inches, fifth story 8 inches.

f. Where there is a cellar under the building, the foundation wall shall be 4 inches thicker than the first story wall.

The acute problem of today is the housing problem, and the housing problem is, after all, the construction problem, and the construction problem is nothing more or less than building costs and the elimination of waste. One of the causes of waste is arbitrary and unintelligent regulation.

In view of the existing lack of much needed residence, school, hospital and other buildings, the exercise of every possible safe and sane economy, consistent with present accepted architectural and engineering practice in construction, and methods of construction, is of the utmost importance.

Architectural and engineering design and inventive genius directed towards legitimate economies should not be limited by the conflicting rulings of building ordinances, which, in many instances, do not appear to be based upon the evidence of scientific tests, investigations and available data.

It seems to me that one way out of this tangle is to endorse the movement suggested by several of the building material associations and now being studied by Secretary Hoover through Mr. Franklin T. Miller, that the Federal Government, through their scientists and engineers, and with the co-operation of the building interests, produce a national basic building code that is applicable to one locality equally with another.

If 18,000 is the allowable unit tension or working stress in reinforcing steel in pounds per square inch in Chicago, it hardly seems fair that the building public of Milwaukee, for instance, be restricted to a unit stress of 16,000. Regulations of this sort spell an economic loss, and when measured throughout the country run into many thousands of dollars. I am defending neither Chicago's nor Milwaukee's regulations, but I do believe that a uniform unit stress for all building materials can be worked out which will provide for a maximum of safety, according to sound engineering practice, at a minimum cost.

Building codes are good codes when they are teaching codes and not taxing codes. If we could be sure of honest installation of materials, then it would only be necessary to have our building codes expressed in two words, "anything safe," but, unfortunately, there are careless manufacturers, contractors and workmen; therefore we cannot have a building code this short, and we must be satisfied in improving and bettering our present regulations.

How can this be done? First, by taking all of the old codes which were written from ten to thirty-five years ago, and some of the new ones also, and either revising them or rewriting them, in which recognition should be given to all materials. There have been many new building materials placed on the market in the past decade, as well as new methods of application. Some are good and some are not so good, but those that have real structural or ornamental value should be recognized. I know of one town that does not even yet recognize the use of reinforced concrete. That building code is holding back the progress of that town, and no doubt this holds true with other building materials.

Provision should be made in writing codes to admit at least a survey and study of all new materials and methods similar to the action taken by your chairman, Mr. Miller, in rewriting the New York Building Code.

There is at least one thought that we wish you gentlemen would carry away with you and that is: The Hollow Building Tile Association wishes and desires to work with you and for you on any hollow tile problem that you may have.

Picric Acid as Blasting Agent

TO prove the utility of picric acid for use in industrial operations, since an accumulation of military picric acid remains as surplus from our war supplies, the Bureau of Mines has conducted an investigation to learn the relative utility of this explosive, and the precautions to be observed in its use and handling. The results of this investigation are presented in "Reports of Investigations, Bureau of Mines," for April, 1921 (Serial No. 2243).

"As compared with the majority of explosives in common use," the report states picric acid "may be regarded as a quite safe explosive. . . . The gravest menace in its use arises from its tendency, when moist, to form picrates. . . . Safety lies in keeping the picric acid away from picrates, and in so protecting it from contact with moisture and metals or metallic compounds that picrates cannot be formed from it."

The tests reported include the trauzl lead-block, which indicated that picric

acid is 18.4 per cent more disruptive than 40 per cent "straight" dynamite, and detailed field tests in stump blasting and bowlder breaking, which "show that picric acid is suitable for use in similar work to that described in this report."

Dangers in Scrapped Containers

THE scrap dealer who purchases old metal tanks, barrels or cylinders should not fail to ascertain definitely the uses to which such containers have been put. If they have held combustible gases or liquids or even certain dry chemicals they are a serious source of danger.

The following case, by no means an isolated instance of the kind, illustrates the point: At a certain Ohio scrap yard, some years ago, an explosion resulted in the death of a workman who was cutting bolt holes in a piece of angle iron. In order to make the work accessible he placed it on a sheet steel drum about 3 feet high by 2 feet in diameter. Unintentionally, he penetrated the steel sheet of the drum, causing the violent explosion of an unsuspected gas which it contained. Both ends of the drum were blown out, one of the ends and several pieces of angle iron striking the victim of the accident, breaking four of his ribs and puncturing his lungs with fatal effect. An inspection of the drum showed that it had been airtight and had contained a substance resumbling sulphur. The dealer stated that he had purchased several of the drums as scrap material some three years previously, and had no idea as to what they had contained.

In many cases the former use of the container may not be suspected, but there are other instances where it should be obvious to a dealer in scrap. For example, everyone engaged in the production of scrap should recognize instantly cylinders used for the storage and transportation of compressed gases. Such cylinders are usually the property of the companies that produce the gases so stored and transported, and their names are generally conspicuously marked on the container in a manner difficult to efface—commonly, by stamping the metal with a die.

Whenever tanks that have been used for explosive gases, liquids or substances are offered for sale as junk, the person offering them should be advised as to their character and warned not to dispose of them for reduction; and the nearest office of the manufacturer, whenever the name is obtainable, should be notified without delay.

Personal Injury Accidents

THE 1919-1920 report of the car and motive power departments of the Delaware & Hudson Company on non-train personal injury accidents shows a decrease of over 30 per cent in the number of casualties reported by the car department for 1920 from the number reported for 1919. The same two years, however, in the motive power department, show an increase of nearly 23 per cent in the casualties reported.

Car department casualties total 153 for 1919 and 106 for 1920. The 1919 total for the motive power department is 220, and for 1920, 270.

Average casualties per 1,000,000 manhours in the car department for 1919 were 29.3; for 1920, 17.5. In the motive power department the same averages were, for 1919 and 1920 respectively, 28.4, and 33.

Causes of Accidents Analyzed

THE 1920 annual report of the Pacific Gas & Electric Company shows that the company's employes met with 1,228 industrial accidents during the year.

The highest percentage from any one cause is 16.53, from flying objects, cinders, dust, pieces of tools, etc.

Flying objects, handling material, slipping, tripping or falling head the list, as in 1917 and 1918.

Hand tools used by the injured take fourth place, protruding objects the fifth, and falling objects the sixth place.

Flying objects cause eye injuries, which can be prevented by wearing goggles.

Accidents from handling material follow haphazard methods, bad laying out of material, carelessness in taking up and putting things down.

Slipping, tripping and falling occur where men fail to look where they are going or to

take the ordinary precaution in walking or climbing.

Hand tool accidents are either caused by awkwardness, or unfit tools, or defective tools, usually tools not properly dressed or sharpened.

Protruding objects usually mean pieces of material sticking out, which scratch or cut the passer-by; slivers and sharp edges mean broken or split pike poles, rough tool handles and the sharp and pointed edges of tools.

Falling objects usually mean tools or material insecurely placed and which are jarred or fall upon workmen.

J. I. Banash, Consulting Engineer

IT may not be generally known that since the first of the year, J. I. Banash, who has been advisory engineer for the acetylene interests, has been in independent practice as a consulting engineer. Although still retaining his old clients, Mr. Banash is specializing on matters of fire and accident prevention and allied lines and is also working on other problems of a general engineering nature. His address is 3642 Jasper Place, Chicago.

The "Why" of Safety Fuses

THE State fire marshal of Louisiana urges that emergency fuses be placed in a sealed cabinet accessible only to the lighting company's employes. Why all this trouble over such a little thing as a fuse? Let us see what a wonderful little thing a fuse is. You have seen electric sparks; these sparks are termed by electricians 'electric arcs', and are produced by two wires of different polarity (negative and positive) coming together. The heat of an arc readily melts the metal of the wire and if the two separated ends of the wires that produced the arc were securely joined together and no fuse or other automatic cut-out was connected in the circuit, the wires in the entire circuit would immediately grow very hot and melt. The electric arc is the greatest artificial heat that man can produce; it will melt the hardest known substance, even the diamond can be converted into gas by its intense heat. The energy in an electric current is inconceivable, it cannot be smothered down and the fuse is the only practical device that can be placed in your house as a protection against this unlimited force.

The fuse is a small piece of metal that is tested and found to melt when the volume of current exceeds a certain amount, such as happens when two wires accidentally come together or when too many lights or heaters are connected to the house wiring. The melting of the fuse opens the electric circuit and thereby stops the flow of current which would cause the destruction of the wires if the fuse were not in the lines to act as a safety device.

Eliminating Waste in Industry

GRATIFYING progress is being made by the Federated American Engineering Societies. Permanent headquarters have been established at 719 Fifteenth Street, N. W., Washington. Among the important committees is the Committee on Elimination of Waste in Industry, the field work of which was scheduled for completion on or before April 15. Publication of the final report of the committee will be undertaken immediately upon the completion of the field work. It is expected that the final report will be published some time in June. The findings of the committee thus far are very significant, and it has every reason to believe that its report will create a great deal of interest.

Heating Convention Extended

THE June semi-annual meeting of the American Society of Heating and Ventilating Engineers has been extended to include June 17, beginning June 14.

Industrial Accidents in Ohio

DURING the period 1912-1920, the Safety Division of the Industrial Commission of Ohio accounts for a minimum total of $80,000,000 for the medical and compensation cost of industrial accidents, and goes on to say that "To measure the total cost of accidents we must add to these figures part of the cost of operating the Industrial Commission, the loss to the

workers in wages over and above the amount of compensation received (which would add from $40,000,000 to $50,000,000 additional), the additional loss to employers arising from the greater labor turnover occasioned by accidents from spoiled material, damaged machinery, and other losses."

The enormous cost that these figures for one State would indicate for the Nation has been recognized by President Harding in a recent speech: "The minimization of casualties in industry is work for which there is a great and pressing need." According to the President, "The economic waste represented by these casualties represents a tremendous burden to the Nation."

One of the recent measures designed to reduce the number of industrial accidents in Ohio is a Construction Code, governing the provisions required to be made for the safety of workmen engaged in the construction, demolition, or excavation of buildings. Hearings on this proposed Code have been held at Cleveland, Toledo, Akron, Youngstown, Cincinnati, Dayton and Columbus. This draft is planned to cover the entire building field.

Caution Leaflet for Employes

THE Mark Plant of the Steel & Tube Company of America, Indiana Harbor, Ind., has issued for distribution to new employes a circular-leaflet calling attention to the importance of safety practices and conditions. It includes seven "Don'ts," as follows:

1. Don't climb between cars.
2. Don't get on or off moving trains when coming to or going from work.
3. Don't take short cuts through mill or over tables and moving machinery. Use subways and bridges provided.
4. Don't get on overhead cranes without notifying operator to stop at regular stairway or ladder.
5. Don't work on any machinery or motor without pulling switch controlling it, and put the "Danger—Do not move" sign on switch.
6. Don't forget your goggles. Ask your Foreman for goggles and wear them when chipping, grinding, or doing any work where particles are liable to strike your eyes. Remember your eyes are very valuable to you and cannot be replaced.
7. Don't attempt to repair any electrical equipment, lights, wires, etc. Call an electrician for such work.

Safety in Permissible Explosives

APPENDED to a statement made by the U. S. Bureau of Mines Relative to the remarkable reduction in recent years in the rate of coal mine fatalities due to the use of explosives is the following table:

Year.	Number Killed.	Percentage of Total Killed	Number Killed per 1000 Employed.
1903	138	9.80	0.339
1904	121	8.64	.290
1905	119	7.49	.264
1906	115	7.27	.246
1907	134	5.29	.264
1908	109	6.17	.216
1909	122	5.88	.244
1910	113	5.09	.203.
1911	72	3.68	.130
1912	70	3.85	.128
1913	63	2.91	.110
1914	56	3.01	.096
1915	76	4.52	.136
1916	60	3.59	.107
1917	55	2.60	.091
1918	85	4.19	.138
1919	57	3.41	...

Fireman's Safety Mask

"GAS Masks for Gases Met in Fighting Fires," which has just been issued by the Bureau of Mines as Technical Paper 248, is the result of tests applied to many types of self-contained oxygen breathing apparatus. The conclusions reached are hopeful for the development of an absorbent for carbon monoxide which will admit of the manufacture of a combination canister which will protect against practically all chemical fumes. The Bureau of Mines gives emphatic warning that the army gas mask is not adapted to or sufficient for fire-fighting.

Sanitation and Personal Hygiene

SICKNESS and accidents are in the same class; while guarding against accidents we should also guard against sickness, remarks J. Leonard Mason of the Sun Shipbuilding Company, who goes on to say that a clean, well-kept plant con-

tributes to health, while the dirty, untidy plant provides a fertile ground for disease.

The same comparison may be made regarding the individual; a man who takes care of his health in matters of eating, sleeping, bathing, exercise and keeping a happy frame of mind is in a condition to withstand infection of disease, while he who neglects the care of his body and weakens his constitution by foolish dissipation is an easy victim.

We speak of the work of keeping the plant clean as "sanitation," and this is a job that needs the co-operation of everyone employed. Let each man be neat in his work. Avoid littering up the place where you work. Keep things picked up and in place. Don't throw things around. Put waste and rubbish in the cans provided for this purpose. Keep all material systematically piled up. This gives the cleaners and sweepers a chance to do their work.

Safety to Reinforce Prohibition

MANY citizens who remain undismayed before the danger of discovery and arrest for the making of "home-brew" may be more impressed by the danger of fires and explosions, both of which occur in the making of still-products. One case, typical of hundreds of others:

Charles W. Mason, New Orleans, suffered a fire. The fire was due to the explosion of a still. Several oil stoves, coils, containers and other paraphernalia used by home brewers are in possession of government officials. In this case it is probable that one of the tanks used became overheated and exploded. The alcohol, catching fire from the oil stove, set the room on fire.

Coal-dust as an Explosive

"TO obtain the best results, as regards safety, in the use of pulverized coal as a fuel in industrial plants," says L. D. Tracy, in "Coal-dust Hazards in Industrial Plants," issued by the Bureau of Mines in its April "Reports of Investigations," everybody connected with the industrial plant must learn to regard coal-dust as explosive, and that "under certain conditions it will ignite as readily as gas." The accidents cited are chiefly in the transportation of pulverized coal to furnaces by compressed-air lines.

California Safety Engineers

THE newly-organized Society of Safety Engineers of California, of which Walter A. Chowen is president and J. C. Chandler is secretary, has lost no time in beginning its activities. The first meeting was held at the Commercial Club on April 25, when Dr. B. M. Rastall, an expert in the employ of the Chamber of Commerce of San Francisco, was the "booster" speaker. Fifty-seven men attended. The Entertainment Committee announced a tentative program for the entire year. It is the society's plan to hold meetings during the latter part of each month, probably in connection with a dinner—a principal speaker and a round-table discussion—taking up a single topic at each meeting.

Engineering Standard Sketches

THE Engineering Department of the Great American Insurance Company has issued a set of drawings showing standards for the use of rubber cement, shaving vault and blowers, metal smoke stacks, bulkheads of roof cornices, etc., and scuppers. Included in the set is a sketch to show lay-out and supplies for automatic sprinkler equipment.

Fires in Industrial Plants

PRACTICAL methods of fighting incipient fires in industrial plants and means of reducing fire hazards and saving lives of employes when trapped and endangered by fire were demonstrated, recently, in connection with the first Industrial Safety Field Day at Chester Park, Cincinnati. The demonstrations were given under direction of the Greater Cincinnati Safety Club for the purpose of teaching representatives of industry methods of fire fighting, fire prevention and rescue work at fires and accidents.

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

G. E. Sanford, Pres. C. Van Horn, Treas. F. A. Doody, Sec.
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DIRECTORS:
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Albert S. Regula, Liberty Mutual Ins. Co. Rowland H. Leveridge, N. J. Dept. of Labor. J. Albert Robinson, Grinnell Co.
Regular Meetings—Fourth Friday of each month at 8 P. M.

PROGRAMS FOR MAY AND JUNE MEETINGS

THE May meeting will be held in the Engineering Societies' Building on May 27. Subject: "Electrical Hazards and Their Safeguards." Papers:

"High Tension Electric Generation and Transmission." By Messrs. C. O. Van Dannenberg and W. W. Samuels, electrical engineers, J. G. White Engineering Corporation. (Illustrated by lantern slides.)

"Electrical Hazards — Terminal Equipment of the New York Central Railroad Entering New York City." By H. S. Balliet, assistant terminal manager, Grand Central Station. (Paper will cover signal systems, locomotives, power lines, etc.)

"Small Motor Problems and Industrial Control." By L. E. Smith, electrical engineer, General Electric Company. (Illustrated by lantern slides.)

PLANS FOR THE JUNE MEETING

Owing to the unpopularity of the plan to hold the June meeting in the country it has been decided to change the plan so as to hold the meeting on June 17 in town, in the Engineering Societies' Building.

The Committee on Education will meet in the afternoon. The evening will be devoted to the presentation of a paper by N. M. DuChemin on "Education in Safety Engineering as given at the Lynn General Electric Engineering and Apprentice School." Discussion on this paper will be opened by the chairman of the Committee on Education, Mr. J. Albert Robinson.

FOR GAS CONTROL IN FIRE FIGHTING

AT the April meeting of the Directors of the American Society of Safety Engineers there was brought up a letter written to Mr. J. Albert Robinson, chairman of the Committee on Fire Protection, by Mr. John H. Derby, from which the following is an extract:

"Since reading over your tentative program of fourteen points, another matter of vital importance has been drawn to my attention, due to several fires which have recently occurred, where the gas connections inside of the building have been melted or broken off, allowing the buildings to be flooded with gas. You will appreciate that this condition makes it next to impossible for firemen to enter the building and also materially increases the fire hazard.

"The present practice of the gas companies in placing a gas cock in the street, or at the curb line, protected by a service box, which is generally covered with snow and ice in winter and is inaccessible, and the fact that the gas cock, being seldom if ever used, becomes corroded and immovable, even if it could be got at, are, in my opinion, matters which have not been given the consideration which the subject demands.

"Therefore, I would recommend that our as-

sociation go on record as advocating that an ordinance be adopted by municipalities to the effect that reliable means be provided for shutting off the gas supply of a building from the street (under the control of the fire department and gas company), which will not be subject to obstruction by snow or ice; said device to be of a type approved by the Underwriters' Laboratories and installed according to rules and regulations prescribed by them."

Acting on this letter the following resolution was passed:

"RESOLVED: That the Committee on Codes and Legislation of this Society be instructed to procure the enactment of provisions requiring reliable and suitable means for shutting off the gas supply of a building from the street by the fire department."

This resolution was referred to the Committee on Codes and Legislation, which is now at work investigating the subject.

Discussions have brought forth many interesting points. The National Board of Fire Underwriters has in its regulations, recommended by the National Fire Protection Association, provisions for shutting off gas outside of a building, but the usual means of doing this in the larger cities have proved to be inadequate, first, on account of the accumulation of ice and snow in winter, and, second, on account of the infreqnency with which sidewalk valves are used and their frequent failure when needed.

Instances have been cited of valves, installed for 30 or 40 years, which have been sheared off by a socket wrench in an emergency. The thought of the Society is that it may recommend legislation providing for the installation of the "reliable and suitable means" mentioned in the resolution. It would then become the duty of other bodies, such as the Underwriters' Laboratories, to determine what these means should be.

PROCEEDINGS OF THE APRIL MEETING

ON Friday, April 29, the regular monthly meeting of the Society was called to order by Eckford DeKay, vice-president, in the absence of President Sanford.

Dana Pierce, vice-president of the Underwriters' Laboratories in charge of the Electrical Branch in New York, read a very interesting paper on "Safety in Relation to Electrical Appliances."

Among the subjects discussed by Mr. Pierce were the methods of protection from shock where alternating currents are used. He explained that there are only two ways in which electricity will cause accidents—by burns and by shocks. These subjects were fully covered in his paper.

Another topic adduced by Mr. Pierce was the testing or the location of the path of return currents on the B. R. T. control system from the tracks to generating stations. These tests were made during the time the cars were at a standstill during President McKinley's funeral. The engineers located currents going over the Brooklyn Bridge to Park Row, then back over the Williamsburg Bridge to the generating stations. Mr. Pierce gave the Society to understand that these conditions have been taken care of, so that the currents do not at the present time follow the course above stated.

Mr. George B. Muldaur, general agent of the Underwriters' Laboratories, submitted a paper on the "Underwriters' Laboratories—Their Organization, Scope and Service." He said that the laboratories are issuing 500 million labels per year, a recent increase from 360 millions per year.

After the two papers mentioned were read, the society had the pleasure of looking at three reels of films illustrating the different departments in the Underwriters' Laboratories Building in Chicago, which showed, elaborately, the testing of electrical equipment, fire doors and fire extinguishers.

It was interesting to note the way large safes were tested. They are put in a furnace in which a temperature of 1,700 degrees is maintained, for one hour. After that the safes are taken into the yard, hoisted to the height

of thirty feet and dropped on a pile of stones and bricks, supposed to represent the condition that would exist if the safe were in a fire and had dropped through the floors to the basement. Later the safe is returned to the furnace, re-heated for one hour and then opened to see the effect of the fire on papers placed in the safe before the first heating. If damaged in no way the safe is considered to have passed the test of the underwriters.

Mr. Muldaur explained that the Underwriters' Laboratories are issuing labels under four branches, namely: fire, casualty, electrical and automobile appliances. He was informed a few days ago that another Council had been started which would take care of protection against burglary.

W. E. CRIPPEN,
Member of Publication Committee.

THE FEDERATED AMERICAN ENGINEERING SOCIETIES

ON February 25, the Executive Board appointed a committee to report on the advisability of The American Society of Safety Engineers becoming a charter member of the Federated American Engineering Societies. It was proposed that another ballot be taken on this question inasmuch as only a small portion of the membership had previously voted on it owing to the fact that its importance was not fully understood, although even on the first ballot the number of votes received showed a two to one majority in favor of joining.

Mr. W. E. Welch, chairman of the committee, had a very lively sense of the importance of the move and apparently inspired the membership with his enthusiasm to such an extent that the returns from the second ballot were unusually full and registered over 90 per cent of the votes in favor of joining. A communication was therefore addressed to Mr. Wallace, the secretary of the Federated American Engineering Societies, advising him that it was the intention of the society to become a charter member and in this way line itself up with the other national engineering societies in participating in this great work of securing the proper recognition for the engineers of the country.

SAFE BUILDING CONSTRUCTION

AT the Building Officials' Conference in Cleveland, April 27, the American Society of Safety Engineers was represented by A. E. Derby and M. R. Marshall.

The subject of safe construction was discussed, a matter in which the public is greatly interested. The public depends upon engineers to see that conditions prevail that protect life and limb.

The standardization and classification of buildings was one of the chief topics of discussion, the opinion prevailing that better and safer methods of building in the different cities is extremely important.

Consideration was given to the question of working with the American Engineering Standards Committee.

Dr. Robert H. Whitten gave an instructive talk on "Building Zones." The general discussion that followed brought out many points of interest, largely due to the fact that the several cities having building zones are not standard. This was demonstrated by a representative from Cincinnati who stated that tenement houses three stories high could be built in the three different zones in Cincinnati of three different types of construction. This did not appear to take into consideration so much the question of the safety of people in buildings as the question of fire resistive construction, which is necessary to eliminate firespread.

The address of William Carver of the Common Brick Manufacturers' Association was exceedingly interesting. It dwelt particularly on the efficiency of an 8-inch wall for small residence buildings, with a standard height of two floors. This, in turn, brought out questions relative to the necessity for the standardization of building codes, as many cities have such obsolete codes that this type of wall is prohibited for small buildings.

A pamphlet, giving a good idea of the new wall, is entitled "An Ideal Wall and the Manner in which Bricks Are Laid Up."

The discussion on "Methods of Inspection," rather short, was given by Mr. Summerill, Building Commissioner of Cleveland. The discussion brought out questions relative to the authority of building departments and their police powers, also the aid the police department gives the inspection department of a municipality.

The question of safety relative to scaffolds was touched on—whether it is the duty of the building inspector to inspect scaffolds before workingmen are allowed to use them. It was generally agreed that it was not his duty and should not be his duty. The building inspector is not in a position to supervise this construction, but if he should note a defective scaffold, he should make a report concerning it to the engineers of construction.

In connection with the scaffold talk the Travelers Insurance Company of Hartford, through its representative, Mr. Marshall, gave to each of those attending the Conference a pamphlet entitled "Protecting the Public." It covers the scaffold question in detail.

LADDER CODE COMMITTEE

CHARLES N. YOUNG, chairman of the Ladder Code Committee, reports that Mr. Goodspeed was elected secretary of the working committee at the meeting on April 25. He is, however, not expected to submit formal minutes of this meeting, as the work of the committee was conducted informally and is represented by alterations made in the tentative draft. Practically the entire code was carefully reviewed and a considerable number of changes were made, as a matter of course. However, no sweeping changes were made in arrangement or subject matter. A revised draft bill will be submitted within a few weeks and it is hoped that two more meetings may bring it to a point where it may be submitted to the sectional committee.

Electric Heat for Industry

A DEMONSTRATION of the advance which has been made during the last few years in electric heating will be presented at the show rooms of the New York Edison Company, Irving Place and 15th street, New York City, from June 6 to 11.

Self contained units in several sizes for localized heating will be shown. These are rated for different degrees of heat and very high temperatures can be produced in any given space. Tubular heaters for heating oils, paraffin and other inflammable liquids where an exposed flame is dangerous will be shown. Electric heating apparatus for candy makers, shoe factories, and the many industries which use heat, will be exhibited and demonstrated, as well as ovens, ranges, soldering irons, branding irons, can-capping tools and glue-pots.

No admission will be charged. The show will be open every day from 9 a. m. to 6 p. m.

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 462 ON THE TRAIL OF THE TRUCKER.—One month when we had balanced up our accident record we found that we had too many injuries due to trucking and handling sheet metal. This led to a very careful study of conditions throughout trucking routes and we were thereby able to locate some of the direct and indirect causes of accidents.

We found, of course, some floor defects which could readily account for a few mishaps. Then the foreman of the department where loading originates gave us a few important suggestions dealing with the problem. We were told that truck stakes for holding on loads were at a premium, so that workmen were using defective stakes or pieces of soft wood that looked like stakes that fitted into the sockets on the truck. This we corrected by ordering a generous supply of hard wood stakes that were cut to fit.

We found also that in the absence of sufficient chain binders to grip the sheet metal to the trucks, some of the men were using the wire that they found in the freight cars they were unloading. The wire was responsible for a few little cuts and infections that occurred in straightening out the kinks and splicing the short lengths. It proved a poor substitute for the binders and was the cause of much delay in addition to the injuries

Fig. 1. Truck with narrow wheel base is easily upset when in this position.

it caused. A more adequate supply of chain binders was the solution of this source of trouble.

In trying to trace the origin of some very carelessly loaded trucks we were told that the night men frequently left dangerous loads for the next shift to handle. As this meant that "the light must be carried to those who were in darkness" we had proper instructions given which resulted in the clearing up of this complaint.

While these interesting things were being brought out we were giving the trucks, proper, the "once over." We found here most everything from a flat wheel to missing nuts and bolts. *But the most important thing, it seemed, was the fact that many of the trucks had a very narrow wheel-base, which we surmised was one of the causes for frequent tipping over of loads.*

We discovered, after some experimenting, that these trucks could be made more stable by simply changing the rear

Fig. 2. Showing rear wheels placed inside the bearings, making a narrow wheel base. Trucking accidents have been traced to this type of construction.

wheels from the inner side of the bearings or hangers to the outside, as shown in the illustrations.

Fig. 1 shows how sensitive the narrow wheel-base is and how easily the equilibrium can be upset when the truck is in a certain position. Changing the wheels to the outside of the hangers makes a difference of 5 inches in the wheel-base, enough to give a more satisfactory resistance to tipping; and the job was accomplished without additional material.

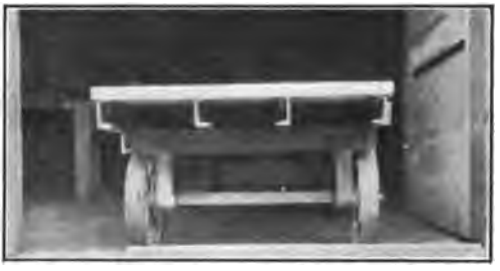

Fig 3. Same truck with wheels placed outside the bearings. Makes 5 inches difference in the base, increasing the stability of the truck. New trucks are to be made that way and old ones changed.

We have used this system of accident analysis, with its variations, in a great many cases and have found it a very satisfactory way to clear up distressing conditions.

Some one has well stated, *"Where there are accidents there is something wrong with men or methods"*—and a little intelligent observation usually will locate the source of trouble.

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No. 463 A Little Experience That May Not Be New, but Which I Have Used With Success along the Line of Safety Education.—Whenever I would see a blackboard, it would bring me back to my happy school days and the blackboard's usefulness. So I had a large board erected in a corner of the plant, and started out to give a noon-time lecture, once a week, on safety.

I would occasionally touch on general topics in order to attract the attention of those not imbued with the safety spirit. The board was used to illustrate my lectures.

Knowing full well the lasting effect of lectures when the point is grasped with the mind and the eye, I would devote a few minutes to demonstration in first aid work, in which I would have the men take part.

I kept a lookout for bargain sales in clothing, groceries, etc., and would use a section of the board to impart that information to the workmen.

At certain periods I would change the positions of the bulletins, so that all the displays would be read.

This section of the plant became so popular at noon-time that we erected benches and tables and the men ate their lunches there, congregating from all sections of the plant. It also became necessary to have some one give a 10-minute talk each day. The remainder of the lunch time would be devoted to general discussion by the men.

The plant was not large enough to afford a house magazine, so the men called the blackboard their daily news center. I always made it a point to have

the safety lessons stick out like a person would who would go out in a blizzard wearing a linen duster. Thus they would attract the attention of believer and unbeliever alike.

I also installed a book with numerical ruled lines, on which the men could inscribe their names each time they read a safety bulletin, with a space opposite for the number of the bulletin they read and any two words the bulletin contained. The men could sign the book as many times, or as often, as they read a bulletin, but the two words would have to be different in each instance.

At the end of each week a drawing would be held. Duplicate numbers of those opposite each name were placed in a receptacle. The men holding the first four numbers taken from it were given prizes of various kinds.

By this book I was kept in touch with the number and personnel of the safety-spirited men in the plant, and when assistance was needed to pull off a safety stunt, I knew the men I could depend on for its successful consummation.

The bulletins announcing sales and bargains saved the men much money, when making their purchases, and so impressed them with the feeling that we were looking after their interest and welfare that a better spirit in general working conditions soon prevailed.

A system of personal advice to the workmen was inaugurated along general lines. Many men took advantage of this service; it added greatly to the morale of the men. All this had its advantages in promoting safety.

❦ ❦ ❦

No. 464 THE SAFETY SALESMAN.—In the not-far-off future when safety work is an established thing and when manufacturers, public and labor have come to realize the importance of correcting all unsafe conditions, credit will be given the man who has heretofore been in the background and who probably has done more, individually and collectively, to make the Nation a safe place in which to live and work and play—THE INSURANCE INSPECTOR.

A good many years before safety work was being advertised as it is today the insurance inspector was on the job. The fire insurance inspector came first but his work was more narrow, being confined to one line and his attention and energies directed against fire hazards only, safety of life outside of the fire hazard not being considered. Then came the liability insurance inspector, who watched all hazards and corrected many.

Behind almost every great movement in history we can trace the financial motive, the dollars and cents of the problem. The insurance companies had to pay for loss of life and for minor accidents occurring in the plants, mines and on the property they covered. It was logical, therefore, that they try to reduce the number of accidents and consequently the amount to be paid. Their policies contained a clause which allowed inspection of all property covered at any time during the policy period. In accordance with this agreement inspectors were sent into the field to mark the hazards and recommend their correction. Today we have in most States safety laws which relate to machine guards, mine protection and public safety. Most of these laws, however, are recent and many are not enforced. In the pioneer days the inspector had no laws to help him and it was strictly up to the man himself to convince the employer or owner—to "sell" him; in other words to show him that safety was good business and a valuable purchase at any price.

The system of merit rating—that is, the plan whereby each employer pays more or less for his insurance according to the condition of his plant, and the cost of incurred losses—has helped the inspector in his work. It enabled him to put an actual value in money on each condition and to say: "Remedy this and you will save so much on your insurance cost each year", "Reduce your loss cost to a minimum and your insurance rate will likewise be reduced".

Here we have a tangible reward for safety work—something you can "put in your hand" as the man from Texas says. Merit rating, crude in former days, is now a carefully considered phase of insurance widely used by the standard

companies and required by law in some States. Therefore, its value *as an insurance factor* is a recognized thing.

But what of its value *with regard to safety work?* Has it not "sold" a lot of safe practices to replace unsafe ones? The dollars-and-cents argument is the easiest selling argument we have, and is, perhaps, the most effective; but the personality of the salesman has undoubtedly greater value.

The insurance inspector was at first and is still in a great many cases a technical man. This is, of course, necessary when inspecting an elevator or a very large and complicated plant where a great amount of mechanical knowledge is absolutely essential. But more and more importance is being given today to the man who can "sell" safety—not the man who can point out hazards, make a note of them and then politely shake hands and leave, but the man who can find those hazards, *then "sell" the owner or employer and get those dangers eliminated.*

It does not help to know that a gear is unguarded if a finger is caught. If an elevator falls and kills several people it does not help then to know that the cables were weak and unsafe. The inspector of value, therefore, is the safety salesman, and the better the salesman the more value he has to the company and to mankind.

The insurance inspector has a great advantage due to the multiple occupations and hazards he comes in contact with. In his accident investigation he learns what actually happened, and how and why, and he can, if a good salesman, turn each accident into a safety rule and by proper exploitation cause the prevention of many other accidents from a like cause.

His greatest value is to the small plants which cannot afford a trained safety engineer. Plants of this kind are legion and contribute largely to the total of killed and injured. The average large plant of today (and by large plant is meant one employing 500 or more people) has its own safety engineer and its perfected organization and does not, therefore, stand in need of the safety salesman. The chances are that such a plant was "sold" originally by an insurance inspector and that its basic plan of organization was outlined by an insurance company or companies. But the small plant cannot afford to maintain a high salaried safety official and must depend upon its insurance carrier for much of its safety information.

Many of these plants were and still are opposed to safeguarding and safety work by reason of the initial cost. Their insurance premiums are not large and the guarding credits do not reflect the amount expended to secure these credits.

Safety must be "sold", therefore, by the insurance inspector out of his personality and knowledge of salesmanship —and sold it is.

Slowly but surely the insurance companies are recognizing the value of the safety salesman. Slowly but surely the industrial plants are being sold the safety idea, they are eliminating their dangerous exposures and educating their employes. The safety movement owes much to the insurance inspector, and his record of lives saved is equalled by few other human agencies.

Comments by Members of the Committee

I find Article 459 most readable. The subject is treated lightly but firmly. The warnings against the non-treatment of wounds at their origin are so pleasantly surrounded that they remind me of the brimstone and treacle of my youth. The average person will swallow the former to enjoy the sweetness of the latter.

Just previous to reading the three April articles, the writer had been looking up material for charts. A study of the causes of our time-losing accidents for January, February and March, 1921, pointed out the fact that three accidents were charged against infection, two were charged to handling and dropping material on feet,

and one accident was charged to defective apparatus. Therefore, had our men reported promptly (as most of them do) we would have cut the number of time-losers 50 per cent. Article 459 applies in our case.

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Article 458 shows an insight into the future which I believe should be commended. It is doubtful whether any of us now actively engaged in accident prevention work will reap the benefits of educating the school children of today in safe practices.

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"Safety First" should be taught in all the public schools, making it a part of the curriculum. When this is done our labors will bear real fruit that will be preserved when the boy or girl enters industrial life and encounters its hazards.

Prizes for March Articles

First Prize. No. 457. *F. H. Rowe, Safety Inspector, Portsmouth Solvay Coke Company, Portsmouth, Ohio.*

Second Prize. No. 458. *N. R. Copeland, Engineering Division, Continental Casualty Company, Salt Lake City, Utah.*

Honorable Mention. No. 456. *Warren Hilleary, Superintendent, Royal Indemnity Company, New York, N. Y.*

Prizes for April Articles

First Prize. No. 459. *William H. Larkin, Jr., Power and Safety Engineer, United States Rubber Company, Passaic, N. J.*

Second Prize. No. 461. *Harold F. Keating, Safety Engineer, Morgan & Wright, Detroit, Mich.*

Honorable Mention. No. 460. *W. H. Aldrich, Superintendent, Southern Surety Company, Des Moines, Iowa.*

Marketing Breathing Machine

WE are informed that the Cleveland Breathing Machine Company has disposed of the sales privileges of its products—the Lyon Breathing Machine and Infant Breathing Machine—for the entire United States and its possessions, for a period of years, to the Hirsch-Crawford Company of 200 Hartman Building, Columbus, Ohio, which will handle these devices through their accredited agents and distributors in a method heretofore unknown in the marketing of resuscitating devices. This selling corporation is amply equipped to effect a more systematic campaign in the way of distribution than the manufacturers were in a position to do, leaving the latter free to attend to the important work of manufacturing a simple and perfect mechanical breathing apparatus. The arrangement mentioned will give the public a greater opportunity to become acquainted with mechanical resuscitating devices.

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

APARTMENT HOUSES

February 14, 1921. Clarksburg, W. Va., 113 Harper street. Light housekeeping apartments, 3-family. One 2-story building damaged. Walls, frame. Cause, clothing ignited from stove. Fire started in rear apartment, kitchen, upstairs. Discovered by tenant returning from errand, at about 10.30 a. m. Alarm, telephone. Duration, thirty minutes. Stopped after three rooms were damaged. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, 10. Killed, 2 (children of tenant who discovered fire). Means of escape, outside stairs. Value of building and contents, $8,000. Property loss, $1,500. Entire damage confined to three rooms in rear.

February 8, 1921. Norfolk, Va. Apartment house, 1101 Holt street. One 3-story building damaged. Walls, brick. Floors, wood. Roof, slate. Cause, cigar or cigarette. Fire started between basement and first floor in elevator shaft. Discovered by janitor at about 10.55 p. m. Alarm, street box. Duration, 4½ hours. Stopped at roof. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, 50. Killed, none. Injured, none. Means of escape, fire escapes. Value of building and contents, $87,200. Property loss, $4,050. Total loss, $34,125.

January 29, 1921. Lansing, Mich. Frances Apartments, owned by Louis Breltenwischer, 909-917 S. Washington avenue. Apartment house, 32-family. One 4-story building partly destroyed. Walls, hollow tile. Floors, wood. Roof, wood and gravel. Cause, unknown, probably from furnace. Fire started in basement. Discovered by outside party at about 1.19 a. m. Alarm, box. Duration, 7½ hours. Fire went the entire length of building. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, 31 families. Killed, none. Injured, none. Means of escape, stairway only. Value of building and contents, $180,000. Property loss, $116,027.

January 3, 1921. Coatesville, Pa. Hotel Taylor, 243 Lincoln Highway. Apartment house, store rooms, garage. One 4-story building damaged. Walls, brick and frame. Floors, wood. Roof, tin. Cause, unknown; possibly rubbish fired from smoking in cellar; no furnace. Fire started in cellar which had considerable amount of rubbish in it. Discovered by garage man, seeing smoke coming through floor at about 10.50 a. m. Alarm, telephone, after some delay in getting central. Duration, 1 hour. Stopped at second floor. Fire was greatly favored by construction of building, which consisted of two brick buildings joined by a frame addition. Firemen handicapped by dense smoke from burning oil in garage. Private fire apparatus, hand extinguishers. Persons in building, 85. Killed, none. Injured, 2 (firemen, overcome by smoke). Means of escape, fire escapes; women from 4th floor rescued by Brandywine Fire Co. No. 2 ladder truck. Value of building, $50,000; contents, $47,000. Property loss, $17,000.

Fire Department protested this frame addition as dangerous at time it was built. Considers garages under apartment houses also dangerous.

December 21, 1920. Sudbury, Ont. Labarge Building, Durham street. Apartment. One 3-story building destroyed. Walls, brick veneered. Floors, wood. Roof, tar and gravel. Cause, unknown. Fired started in dumbwaiter on top floor. Discovered by someone entering apartment at about 11.30 p. m. Alarm, telephone. Duration, seven hours. Stopped at third floor. Private fire apparatus, none. Persons in building, about 38. Killed, none. Injured, none. Means of escape, fire escape and stairs. Value of building and contents, $63,000. Property loss, $27,000.

December 17, 1920. Hartford, Conn. Jewell Court, 210 Farmington avenue. Apartment house. One five-story building damaged. Walls, brick. Floors, wood. Roof, wood. Cause, match thrown in waste-chute. Discovered by occupant at about 8.15 p. m. Alarm, telephone and fire alarm box. Duration, two hours. Stopped at roof. Fire was favored by construction of buildings. Firemen handicapped by open chutes. Private fire apparatus, none. Means of escape, fire escapes. Value of building and contents, $500,000. Property loss, $60,000.

December 12, 1920. Terre Haute, Ind. Edgewood Grove Apartment House, 88 Potomac avenue. One two-story building damaged. Walls, brick veneer. Floors, wood. Roof, composition. Cause, started from furnace in basement. Discovered by occupant at about 4.55 a. m. Alarm, telephone. Duration, one hour. Stopped at top of side walls, immediately beneath cornice. Fire was favored by brick veneer construction of building. Firemen handicapped by dense smoke. Private fire apparatus, none. Persons in building, 15. Killed, 1. Injured, none. Means of escape, stairways. Value of building and contents, $50,000. Property loss estimated at $1,000.

The life lost was that of the janitor, who was trapped in the basement, where he slept.

December 8, 1920. Detroit, Mich. Apartment house at 176 Selden avenue. Light housekeeping rooms. One two-story building damaged. Walls, brick and wood. Cause, supposed careless smoker. Fire started under stairway. Discovered by citizen at about 3 a. m. Alarm, street box. Duration, two hours. Confined to building. Private fire apparatus, none. Value of building, $7,500. Property loss, $4,227.

December 5, 1920. Crisfield, Md. Apartment house on South Side (Main street extended). Two buildings, two- and one-story, totally destroyed. Walls, frame and brick. Cause, unknown. Fire started in apartment house. Discovered by tenant entering apartment at about 1.10 a. m. Alarm, regular. Duration, 3½ hours. Stopped at next building. Fire was favored by construction of buildings. Firemen handicapped by out of town-limits location of fire, making it necessary to run hose through woods. Private fire apparatus, none. Building unoccupied. Means of escape, stairs. Value of building and contents, $12,000. Property loss, $12,000. The nearest hydrant was at the nearest point on the town-limits, 850 feet away.

November 13, 1920. Revere, Mass. Apartment house at 157-159 Hichborn street. One three-story building partly destroyed. Walls, wood. Floors, wood. Roof, wood. Cause, unknown. Fire started in partition on second floor. Discovered by occupant of third floor at about 1.11 a. m. Alarm, telephone. Duration, two hours. Stopped at roof. Private fire apparatus, none Persons in building, 15. Killed, none. Injured, 2 (firemen). Means of escape, front and rear piazzas. Value of building and contents, $15,500. Property loss, $4,200.

November 12, 1920. Wilmington, Del. Waverly Apartments, north of city, near center. One five-story building damaged. Walls, brick. Floors, wood. Roof, slag. Cause, waste paper. Fire started in bottom of shaft. Discovered by tenant at about 10.20 p. m. Alarm, box call. Duration, two hours. Stopped at fourth floor. Fire was favored by construction of building. Fire followed shaft to roof and burned only two rooms on top floor, besides shaft and roofing. Private fire apparatus, none. Persons in building, 90. Killed, none. Injured, none. Means of escape, fire escape. Value of building and contents, $150,000. Property loss, $4,000.

November 3, 1920. Philadelphia, Pa. Brantwood Apartments, 4130-40 Parkside avenue. One four-story building damaged. Walls, brick. Floors, wood. Roofs, tin and tile. Cause, defective wiring. Fire started in loft on fourth floor. Discovered by occupants at about 10.30 a. m. Alarm, telephone. Duration, four hours. Stopped at roof.

November 1, 1920. St. Louis, Mo. Apartment house at 5540 Delmar avenue. One three-story building damaged. Walls, brick. Floors, wood. Roof, composition. Cause, hot ashes. Fire started in basement. Discovered by occupant at about 7.10 a. m. Alarm, still alarm and box alarm. Duration, one hour. Stopped in basement. Fire was retarded by construction of building. Private fire apparatus, hand chemicals. Persons in building, 40. Killed, none. Injured, none. Means of escape, fire escape. Value of building and contents, $75,000. Property loss, $3,600.

October 25, 1920. San Antonio, Texas. Apartment house at 312 Linares avenue. One 2-story building destroyed. Walls, wood. Floors, wood. Roof, shingle. Cause, unknown. Fire started on second floor. Discovered by occupants at about 12.20 a. m. Alarm, telephone. Duration, forty minutes. Stopped at ground. Fire was favored by wooden construction of building. Firemen handicapped by shortage of water and long distance to travel. Private fire apparatus, none. Persons in building, 2 families. Killed, none. Injured, none. Means of escape, stairway. Value of building, $7,500. Contents, $3,000. Property loss, $10,500.

October 13, 1920. New Rochelle, N. Y. Apartment house at 19-25 Rose street. Old Law tenement house. One 5-story building destroyed. Walls, brick. Floors, wood. Roof, slag. Cause, spontaneous combustion of painters' materials. Fire started in cellar. Discovered by janitor at about 1.15 a. m. Alarm, street box. Duration, four hours. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, 150. Killed, none. Injured, 1. Means of escape, department ladders and fire escapes. Value of building and contents, $150,000. Property loss, $100,000.

September 30, 1920. St. Louis, Mo. Apartment house at 5727 McPherson avenue. One 3-story building damaged. Walls, brick. Floors, wood. Roof, composition. Cause, rubbish. Fire started in cellar. Discovered by tenants at about 6.13 a. m. Alarm, street box. Duration, one and one-half hours. Confined to basement. Fire was favored by wooden floors and partitions. Private fire apparatus, 3-gal. extinguishers. Persons in building, 40. Killed,

none. Injured, none. Means of escape, fire escape. Value of building and contents, $54,000. Property loss, $1,700.

September 7, 1920. Cambridge, Mass. Bromley Court. Apartment house. One 4-story building damaged. Walls, brick. Floors, wood. Roof, tar and gravel. Exact cause unknown. Fire started in waste basket in back stairway. Discovered by tenants. Alarm, street box. Duration, three hours. Stopped in building of origin. Fire was favored by second class construction. Private fire apparatus, none. Persons in building, about 75. Killed, none. Injured, none. Means of escape, stairways and fire escapes. Value of building and contents, $244,220. Property loss, $66,475.

August 15, 1920. Westmount, Que. Metcalfe Apartments, corner of Metcalfe avenue and Cote St. Antoine road. One 3-story-and-basement apartment house badly damaged (three apartments in center wing). Walls, brick. Floors, hardwood. Roof, tar and gravel. Cause, unknown. Fire started in basement near location of 28 gas meters. Discovered by janitor at about 1.20 a. m. Alarm, telephone first; later box pulled by constable on patrol. Duration, one hour. Stopped at party walls, first floor. Fire was favored by construction, owing to quantity of woodwork. Firemen handicapped by large number of gas meters located together in open basement, and inability to reach main stopcock of gas. Private fire apparatus, Babcock's. Persons in building, about 100. Killed, none. Injured, 1 (fireman, overcome by gas). Means of escape, external fire escapes of iron. Assessed value of building and contents, $100,000. Property loss, $5,000 (exclusive of some unoccupied apartments for which contents-loss was not obtained. Damage limited to basement, first floor, and part of party walls.

July 18, 1920. El Centro, Calif. Apartment houses at Fourth and Olive streets. Two 1-story buildings destroyed. Walls, redwood siding on 2 x 3 studs. Roofs, shingle. Cause, cigarette. Fire started in paper receptacle where cigarette was thrown. Discovered by owner at about 6.30 a. m. Alarm, neighbor called by telephone. Duration, two hours. Stopped at top of ground. Fire was favored greatly by very thin dry walls. Firemen handicapped by delay in turning in alarm. Private fire apparatus, none. Persons in building, 40. Killed, none. Injured, 2 (in building adjoining that of fire-origin). Means of escape, very good. Value of building and contents, $15,000. Property loss, $15,000.

June 20, 1920. Vancouver, B. C. Balmoral Apartments, 1148 Thurlor street. One 6-story building destroyed and two dwellings damaged. Walls, brick and tile. Floors, wood. Roofs, metal covered. Cause, unknown. Fire started in basement. Discovered by janitor, who found basement in flames at about 10.44 p. m. Alarm, telephone. Duration, eight hours; but under control in one and one-half hours. Stopped at roof. Fire was favored by faulty and poor construction of building, all wood inside. Private fire apparatus, none. Persons in building, about 75. Killed, 5 (2 of the 5 killed jumped from fifth floor). Injured, 9. Means of escape, 2 escapes. Value of building and contents, $172,200. Property loss, $93,606.

April 26, 1920. Boston, Mass. Building at 24 Montebello road, Jamaica Plain. Six apartments in course of construction. One 3-story building destroyed and two others scorched. Walls, wood. Floors, wood. Roof, wood, tar and gravel covered. Cause, unknown. Fire probably started in center of building. Discovered by citizens at about 8.35 p. m. Alarm, fire alarm box. Duration, about one and one-half hours. Stopped when building burned to ground. Fire was favored by wooden construction of building, and unfinished condition, without windows or doors. Spread of fire was also favored by high elevation. Firemen handicapped by delay in sending in alarm. Private fire apparatus, none. Building unoccupied. Means of escape, front and rear stairways. Value of building, about $7,000. Property loss, about $7,000.

February 27-28, 1920. Wilkinsburg, Pa. Cambria Apartments, 607-609 South avenue. Stores and apartments. One 3-story building damaged. Walls, brick. Floors, wood. Roof, slag. Cause, carelessness. Fire started in locker rooms on first floor. Discovered by one of the tenants at about 7.30 p. m., February 27. Alarm, verbal, by tenant. Duration, 7 hours. Stopped at third floor, about center of building. Fire was favored by partitions of lath and plaster; there were no fire walls. Firemen handicapped by insufficient number of men. Private fire apparatus, none. Persons in building, 40. Killed, none. Injured, 2 (firemen). Means of escape, stairways only, no fire escapes. Value of building, $65,000. Property loss, $35,000.

The building had formerly been a garage, and had been converted into an apartment and store rooms.

February 10, 1920. Chicago, Ill. Apartment building, 220 East Walton place (under construction). One 10-story building damaged. Walls, concrete. Floors, concrete with hardwood covering (unfinished). Roof, cement (unfinished). Cause, spontaneous combustion of oily rags used by workmen, and left on floor, with sawdust and shavings from floor-planing machine. Fire started, fourth floor. Discovered by watchman at about 1.30 a. m. Alarm, telephone. Duration, twenty minutes. Stopped at floor where it started. Fire was retarded by almost fireproof construction of building. Private fire apparatus, none. Persons in building, 1 (watchman). Killed, none. Injured, none. Means of escape, inside and outside stairways. Value of building and contents, $600,000. Property loss, $3,000.

This loss was confined to the wood trim and windows of 6 rooms.

Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

ARE MARBLE STAIR TREADS SAFE?

A clause in the New York City Building Code and one similar in the New York Labor Law requires that:

> "Stair treads shall be constructed and maintained in such manner that persons walking thereon will not slip."

Such a provision should have very good reasons for its existence, for it restricts materials for use as stair treads to those that are so constructed and can be continuously maintained throughout their life in such manner that they shall not cause slipping. Materials that allow slipping are not permitted for use as stair treads.

In the case of some types of tread materials it may be contended that such provisions are a hardship and should be interpreted liberally. Let us consider the hazard such a provision is designed to eliminate. Is it serious enough to warrant stringent measures—the prohibition of *all* materials that do not easily come up to the requirements of the code?

The stair hazard is one of the most serious with which we have to contend in accident prevention. Of the 76,000 fatalities per year in Continental United States, about 15,000 are caused by falls, over one-half of them occurring on stairs and floor level. In Chicago, elevator fatalities have averaged about 12 per year for the past ten years. Fatalities from conflagration have been from 6 to 10 per year, while the number of deaths by falls on stairs have numbered from 80 to 100. In New York City, according to the Coroner's office reports for Manhattan only, in 1914 falls on stairs killed 102; in 1915, 93; in 1916, 137; in 1917, 105; in 1918, 79. It should be noted that these fatalities from falls on stairs exceed in number the total from conflagrations, elevators and surface cars.

From the foregoing facts it will be understood why the greatest care should be taken to provide step treads so constructed that they are and can be maintained in a non-slip condition.

With reference to accidents on marble stairs, particularly, I have just received a letter from Chicago, stating that the "Man in charge of the new Tribune building slipped on marble stairs and ruptured himself so badly he had to go to the hosiptal and be sewed up."

I recall that in New York City the Title Guarantee & Trust Co., at 176 Broadway, had one of their employes severely injured by slipping on marble steps. They then covered all their marble steps with an effective anti-slip tread. The same experience was had by the New York Life Insurance Co., and they adopted the same remedy, with the result that no accidents have occurred since.

Additional instances of accidents on marble steps are quite numerous and may be obtained from the insurance companies.

In isolated cases some types of white marbles are satisfactory, but rarely are the pink and black marbles sufficiently anti-slip to be permitted. The same thing is true with slate. Those types of slate having hard gnarls and ribbons running through them are particularly dangerous.

The good appearance for which marble primarily is used may be retained and marble and other materials may be used for artistic

effects with perfect safety if they are equipped properly with a good anti-slip tread. This raises another question. Do safety treads prevent accidents to such an extent that their use should be encouraged or required?

As to whether the use of good anti-slip treads prevent casualties, the experience of the Pennsylvania R. R. Co. is noteworthy. They had 141 accidents in eight weeks' time on certain of their stairs in Philadelphia. They then equipped those stairs with safety treads having the anti-slip element embedded in the nosing and the entire wearing surface, and no heel-catching grooves parallel to the edge, were there. No accidents occurred in the following three months, during which time observers were stationed there, showing that the use of a good anti-slip tread properly constructed practically eliminates stair accidents.

The experience of the H. L. Doherty Co. also shows the advantage of anti-slip treads. The casualties in 29 properties for six months, ending December 31, 1915, after adoption of anti-slip treads showed that, though there was an output *increase* of 33.1 per cent, a total casualties increase of 31.2 per cent, a total lost time increase of 11.6 per cent, there was a decrease in slipping casualties of 57.1 per cent and in slipping casualties lost time of 34.7 per cent.

It should be noted in both the foregoing cases that stairs were equipped with hand rails both before and after installation of safety treads. They are not as important, in comparison with safe treads, as the emphasis usually laid on them would lead the uninitiated to believe. There is a case recorded in the Milwaukee Supreme Court, where a woman holding a rail tripped on unsafe tread, loosening her grasp of the rail and throwing her down six or seven steps. She recovered $1,500. The tread was one of the grooved types.

There is another feature that should be borne in mind in connection with stair treads. In most of the codes, standards, etc., recognition is given to only two conditions—the safe and the unsafe, or defective. There are really three distinct conditions. What is usually called the defective condition is very well defined, and should be termed for convenience, the *sub-normal condition.*

There is the normal condition, which applies to concrete, wood, asphalt, iron, steel, etc., when new or in good condition of repair, but this condition may be transformed readily into an unsafe condition by mud, oil, soapy water or concentrated wear. However, as this is the usual condition, it would be well to call it *normal.* There is, also, a *super-normal* condition, which is obtained by the use of materials of extreme durability with anti-slip properties which remain anti-slip even under adverse conditions of service. Such super-normal conditions are obtained by the use of treads manufactured particularly for this purpose.

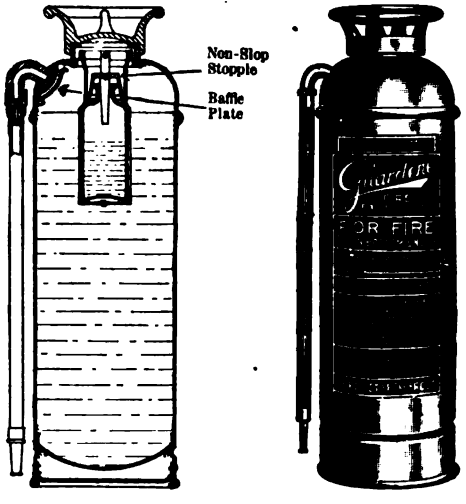
Treads such as the Feralun, the Universal anti-slip, and the Norton tile transform unsafe and normal conditions to the super-normal, almost eliminating the hazard on stairs. Their use on marble stairs will not mar the architectural beauty thereof. In fact, only by their use will the stair function safely and so be architecturally complete.

AN IMPROVEMENT IN SODA AND ACID EXTINGUISHERS

How to devise means for preventing the water in the 2½ gallon soda and acid extinguisher from slopping over into the acid container and thereby weakening the charge has puzzled extinguisher engineers for a long time.

Try as they would, they could not design the acid bottle and its container to make the acid immune to the shaking and jarring that this type of extinguisher is constantly exposed to when installed on heavy vehicles such as trucks, tractors, harvesting machinery, railway cars, fire equipment trucks, etc. Some companies have experimented with a sealed-bottle type but as these required a valve to open them, or the breaking of the bottle, they never earned the approval of the Underwriters' Laboratories.

After considerable costly experimenting the Pyrene engineers have succeeded in producing an arrangement for their acid bottle which contains all the advantages of the sealed bottle type, with none of its disadvantages.



The acid bottle in the Non-Slop Guardene is protected by a special stopper shaped like an inverted cup and the outlet is covered by a baffle plate. This makes it absolutely slop-proof, no matter how severely the extinguisher is shaken by the vehicle to which it is attached.

The Non-Slop is approved and labelled by the Underwriters' Laboratories. Full particulars may be secured from the manufacturers, The Pyrene Manufacturing Company, New York, N. Y.

THE STIER'S PUNCH PRESS GUARD

The automatic safety guard for power punch press shown herewith has the advantage of enclosing the point of operation or danger zone entirely. While the punch is descending, the operator is absolutely protected in case the guard repeats. It is easily attached to the machine, allows operation at any speed, but the slightest interference by a hand, finger or even a wire brings the machine instantly to a halt. The rubber at the side of the lever prevents even a mark upon hand or finger, and the machine cannot start again until the obstruction is removed and the guard is once more in a closed position. As one safety expert remarked after examination of the guard, "It is absolutely fool-proof, for the reason that it is not merely a device, but a real guard protecting the point of operation from all sides."

The Stier's Automatic Guard has been approved and endorsed by the Labor Departments of all industrial states. The manufacturers, the Stier's Corporation, 5 East 16th street, New York, are issuing a circular showing several views which illustrate clearly the new side guard feature and this circular contains a very imposing list of concerns which are now using the device.

NON-FOGGING GOGGLES

The latest perfection of E. D. Bullard's Safety Equipment is the Edwards Non-Fogging Goggle.

This goggle was perfected under actual conditions in the Moore Shipbuilding Co.'s yards of San Francisco. It took over a year of constant experimenting to at last perfect a goggle that will not fog under any conditions.

The Edwards Non-Fogging Goggle is now being used by all the large shipyards on the Pacific coast, especially for workmen in hot or cramped jobs. The special construction of this goggle is as follows:

Two lenses placed between rubber gaskets, making an airtight compartment, thereby absolutely making fogging impossible. Also this construction makes it impossible for any particle of glass from a broken lens to enter the eye of the wearer.

Although this goggle is made especially for shipbuilding work, it has proven itself admirable for any industry where the tendency to cloud or fog is prevalent.

The firm of E. D. Bullard, 268 Market St., San Francisco, is the sole manufacturer of this goggle and would be glad to forward to any Safety Engineer a sample on request.

A NEW WESTINGHOUSE PUBLICATION

We are in receipt of Volume 1, No. 1 of "Light Touches" the sub-heading of which describes it as "A magazine that touches your light problems." This will be issued monthly by the Westinghouse Lamp Company from their New York office, and the reason of its existence will be to create a friendly clearing house for the discussion of problems relating to the sale, installation and use of modern lighting units. The first issue is well edited and gives promise of being a useful house organ.

THE TISCO CATALOG

The expected catalog from the Imperial Safety Supplies Company of Cleveland has been issued and it is in loose leaf form so that it will accommodate the rapidly increasing line handled by this new and progressive organization. The catalog opens with pictures of the personnel of the company who wish to introduce themselves thoroughly to the field. The catalog then shows various kinds of guards which are manufactured by the company and these are followed by the long line of products sold, including respirators, hoods, helmets, masks, shields, protective clothing, gloves, shoes and leggings, first aid supplies and hospital equipment, fire extinguishers, shaft oilers, goggles and numerous other specialties.

In order to keep this loose leaf book up to date, the prices are on a separate sheet and it is apparently the idea of the company to issue monthly corrections which will make it very convenient for the buyer.

VIKING FIRE PROTECTION EQUIPMENT

The slogan of the Viking Corporation of Hastings, Mich., is "Progressive Independence," and under this heading they are introducing a complete line of automatic fire protection apparatus designed and built along the most modern and approved standards, in a completely equipped up-to-date plant, backed by an engineering and manufacturing organization of recognized standing and years of experience, and with ample capital for all present and future needs.

The president of this organization, Colonel Tyden, is also president of the International Seal & Lock Company and the Hastings Table Company, both of which industries are located in Hastings. He is well known, and is acknowledged as an expert insofar as designing of production machinery is concerned, having been actively in charge of the Rock Island Arsenal during the late war. Mr. Gunnar O. Liljegren, the vice-president, has been in the automatic fire protection business for the past 18 or 20 years, and is an acknowledged authority on these matters. He is well known in the fraternity all over the country, and is the inventor and designer of the Viking-Sprinkler Head, which is fully covered by patents. He is also in charge of their Engineering Department.

Mr. C. H. Peterson is an engineer and manufacturer by training, having been connected with a number of large industries. For 15 years he was with the Baldwin Locomotive Works, and during the last two years, in Chicago, as president of The Iron Mountain Company, a firm of expert engineers and manufacturers. He is also a member of the A. S. M. E. and the S. A. E. Mr. Liljegren also is a member of the American Society of Mechanical Engineers.

The business will be conducted largely through the establishment of reputable and experienced licensees, located at convenient points. They are very insistent that these men be qualified to handle sprinkler work as engineers and contractors.

"SAFETY-IZING" THE SAFETY SIGN

"Some people are never satisfied. They always want something better. Give them a bungalow and they pine for a mansion; hand them a seat in the parquet and they look wistfully at the box.

"And it's a trait that accounts for a lot of progress. It shows up strong in a very important improvement just announced by the Stonehouse Steel Sign Company, of Denver. This consists in the making of their Steel Accident Prevention Signs hereafter with rounded safety corners.

"Every one is familiar with the ordinary steel sign with its sharp, wicked, square corners, carrying always the threat of injury to the person handling or installing it. Therefore, the new Stonehouse Rounded Safety corner idea is a big practical improvement. It eliminates the danger of handling these steel signs, and makes the posting of them comfortable and safe. As Mr. Stonehouse says 'We not only improve our signs to the fullest extent, but we improve the corners as well.'

"This latest and very valuable improvement follows many such original ideas in sign progress introduced and used by this company. They seem to be never satisfied with their own signs, and constantly plan to make them better. This fact is pretty well known among safety engineers.

"The knowledge of what the safety men want is due to the close touch the company maintains with the requirements of the safety movement. In fact, the Stonehouse Steel Company was an early member of the National Safety Council, its membership number being 275, and these numbers now run to something like 8,000."

CUTLER-HAMMER SYSTEM

The Cutler-Hammer System—"Safest in the World," is the title of a 16-page, 8½ x 11 booklet with a two-color cover, recently published by The Cutler-Hammer Mfg. Co. of Milwaukee and New York. The booklet illustrates and explains the new line of control apparatus which has recently been developed by this firm for use with high speed newspaper presses. The Cutler-Hammer System provides for driving, control and speed regulation of high speed presses under conditions of exceptional safety. Safety for the press operator is assured by so designing the control equipment that

both visual and audible signals are given before the press can be started; these signals warn the men working about the press so the machinery will not be unexpectedly started, with resultant danger to the workmen. All movements of the press are controlled from pushbutton stations, which are located so as to be convenient to the pressmen.

The booklet also takes up briefly the C-H Dispatch Conveyor for conveying folded papers from the press to the mailing room; the Electric News Bulletin, which gives simultaneous announcement of news in bulletin form at one or several different points under control of a keyboard at some central location; the C-H Automatic Paper Splicing Machine, which splices news printing paper without marring the printed sheet; the Type H Drive for paper calenders; Electric Linotype and Monotype Pots; and Heating Equipment for Matrix Beds.

METAL CHAIN FOR FIRE PROTECTION

In case of fire, one of the first instructions instilled in the minds of all students in colleges, and others who are being trained to act quickly in emergency, is to close the windows to avoid draught, as the circulation of air is the thing which makes a fire develop and spread rapidly. In school fire drills this is of prime importance. The reason is obvious.

Consequently, in hanging windows, it is very essential to use material which cannot burn, thereby allowing the windows to drop and automatically open, creating the draught which will feed the fire.

This feature has been overcome by The Smith & Egge Mfg. Co., of Bridgeport, Conn., who over forty years ago invented Sash Chain as a substitute for Cord.

Metal chains are now universally used in all the larger buildings throughout the country because of their fire-resisting quality.

The above company makes three distinct grades, "Giant Metal," "Red Metal," and Steel Sash Chain. The first two are Bronze metal and the last one is Steel. The latter is furnished in Sherardized finish or Galvanized finish to make it additionally fire-proof and to preserve the life and strength of same.

Their chains are endorsed and rated by the Underwriters' Laboratory of Chicago, besides being specified by the leading architects for large construction work. The Woolworth Bldg. alone took over 50,000 ft. of their No. 1 "Giant Metal" Sash Chain.

Another product of this company is Cable Chain, a flat riveted chain, suitable for use on fire doors, elevator gates, safety gates, etc., where very heavy weights are required. These chains are furnished in both Steel and Copper.

The Emergency Fleet used many tons of their No. 10 Copper Cable Chain during the war.

Literature regarding Sash Chain will be cheerfully furnished by the above concern, by addressing them direct.

UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

KNIFE SWITCHES—New Haven Electric Mfg. Co., Mfr., North Haven, Conn.

LAMP GUARDS—Electric Service Supplies Co., Mfr., 17th and Cambria Sts., Philadelphia, Pa.

MEDIUM BASE SOCKETS—Bryant Elec. Co., The, Mfr., Bridgeport, Conn.

OUTSIDE HAND-OPERATED DISCHARGE DEVICE—National Store Specialty Co., The, Mfr., Bareville, Pa.

PANELBOARDS—Cutter Co., George, Mfr., 32 S. Peoria St., Chicago, Ill.

PANELBOARDS—Mutual Elec. & Mach. Co., Mfr., 858 W. Fort St., Detroit, Mich.

PENDENT SWITCHES—Beaver Machine & Tool Co., Inc., Mfr., 625 N. Third St., Newark, N. J.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

RECEPTACLES FOR ATTACHMENT PLUGS—Peerless Light Co., Mfr., 663 W. Washington Blvd., Chicago, Ill.

RECTIFIERS—General Electric Co., Mfr., Schenectady, N. Y.

SERVICE ENTRANCE OUTLET BUSHINGS—Standard Electrical Mfg. Co., Mfr., 220 High Ave., Cleveland, O.

SIGN FLASHERS—International Finance Co., Mfr., 310 Pacific Block, Seattle, Wash.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Burton Co., W. J., Mfr., 5650 Federal Ave., Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD FIRE WALL DOOR—Candler Roofing Co., J. D., Mfr., 551 E. High St., Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Carlson Bros. Co., Mfr., 1216-18 Banks Ave., Superior, Wis.

SURFACE SNAP SWITCH SUB-BASES—Pass & Seymour, Inc., Mfr., Solvay, N. Y.

SURFACE SWITCHES—Hart & Hegeman Mfg. Co., Mfr., 342 Capitol Ave., Hartford, Conn.

SWITCH BOXES—Motor City Stamping Co., Mfr., 771 Maxwell St., Detroit, Mich.

WIRE CONNECTOR—Simpson, Alexander B., Mfr., 152 E. 53rd St., New York, N. Y.

ARMORED CABLE—Arrow Flexible Conduit Co., Inc., Mfr., 212 Canal St., New York, N. Y.

ARMORED CABLE—Short Electrical Mfg. Corp., Mfr., Penn Yan, N. Y.

AUTO-STARTER—Industrial Controller Co., Mfr., Milwaukee, Wis.

AUTOMATIC SPRINKLER—Hodgman Mfg. Co., Taunton, Mass.

AUTOMATIC SWITCHES—MACHINE OPERATED TYPE—Westinghouse Electric & Mfg. Co., Mfr., East Pittsburgh, Pa.

BRONZE HOSE VALVES—FOR FIRE SERVICE—Kelly & Jones Co., The, Mfr., Greensburg, Pa.

CABINETS AND CUTOUT BOXES—SHEET METAL—American Metal Products Co., The, Mfr., 277 Minna St., San Francisco, Calif.

CARTRIDGE ENCLOSED FUSES—RENEWABLE—Pierce Fuse Corp., Mfr., 752 Main St., Buffalo, N. Y.

CHEMICAL ENGINE HOSE—Goodyear Tire & Rubber Co., Akron, Ohio.

CHEMICAL EXTINGUISHER, 2½-GAL. LOOSE STOPPLE TYPE—Fire Equipment and Engineering Corp., Submittor, 330 W. 58th St., New York, N. Y.

CHEMICAL EXTINGUISHER, 1-QT. PUMP TYPE—General Mfg. Co., The, Submittor, 18th & Pine Sts., St. Louis, Mo.

CONDUIT BOXES—All-Steel-Equip. Co., Mfr., Aurora, Ill.

CONDUIT BOXES—Clemence Bros., Mfr., 164-166 Linden Ave., Irvington, N. J.

CONDUIT BOXES—Hope Foundry & Machine Co., Mfr., 353 Boyden Ave., Hilton, N. J.

CONDUIT BOXES—Killark Electric Mfg. Co., Mfr., 3940 Easton Ave., St. Louis, Mo.

CONDUIT BOXES—Michigan Stamping Co., Mfr., Detroit, Mich.

CONDUIT BOXES—MARINE—Benjamin Electric Mfg. Co., Mfr., 120-128 S. Sangamon St., Chicago, Ill.

ELECTRIC FIXTURES—Simes Co., The, Mfr., 22-26 West 15th St., New York, N. Y.

ENCLOSED SWITCHES—Columbia Metal Box Co., Mfr., 224-228 East 144th St., New York, N. Y.

ENCLOSED SWITCHES—Johns-Pratt Co., The, Mfr., Hartford, Conn., Johns-Manville, Inc., Sole Agents, New York, N. Y.

ENCLOSED SWITCH—Square D Co., Mfr., Detroit, Mich.

EXTINGUISHER, 2½-GAL. HAND PUMP TYPE—General Mfg. Co., The, Mfr., 18th & Pine St., St. Louis, Mo.

FITTING FOR CONDUIT BOXES—COVERS—All-Steel-Equip. Co., Mfr., Aurora, Ill.

FIXTURE FITTINGS—Butler Electric Co., Mfr., 3531 Cottage Grove Ave., Chicago, Ill.

FIXTURE FITTINGS—National X-Ray Reflector Co., Mfr., 235 W. Jackson Blvd., Chicago, Ill.

FIXTURES—Benjamin Elec. Mfg. Co., 120-128 S. Sangamon St., Chicago, Ill.

FIXTURES—Cryptofil Mfg. Co., Mfr., 53 State St., Boston, Mass.

FLEXIBLE STEEL CONDUIT—Arrow Flexible Conduit Co., Inc., Mfr., 212 Canal St., New York, N. Y.

FLEXIBLE STEEL CONDUIT—Dewes Co., The A., Mfr., 199 Lafayette St., New York, N. Y.

FRAMES—SINGLE TYPE—Lee & Son Co., Thomas, Mfr., 128-132 W. Second St., Cincinnati, O.

FUSED ROSETTES—LINK TYPE—Weber Electric Co., Mfr., Schenectady, N. Y.

FUSELESS ATTACHMENT PLUGS—Benjamin Electric Mfg. Co., Mfr., 120-128 S. Sangamon St., Chicago, Ill.

FUSELESS ATTACHMENT PLUGS—Pass & Seymour, Inc., Mfr., Solvay, N. Y.

FUSELESS ATTACHMENT PLUGS—Union Electric Co., Mfr., Hamilton Ave. & Clark St., Trenton, N. J.

GROUND CLAMPS—Alloy Metal Stamping & Specialty Co., Mfr., 444 No. 13th St., Philadelphia, Pa.

GROUND CLAMPS—Machen Electric Mfg. Co., Inc., Mfr., 4639 E. Thompson St., Philadelphia, Pa.

GROUD CLAMPS—Utility Fittings Co., The, Mfr., 1932 E. Westmoreland St., Philadelphia, Pa.

HARDWARE—SLIDING PATTERN—Lee & Son Co., Thomas, Mfr., 128-132 W. Second St., Cincinnati, O.

HEATER CORD—American Electrical Heater Co., Mfr., Woodward, Burroughs & Cass Aves., Detroit, Mich.

HEATER CORD—Crescent Insulated Wire & Cable Co., Mfr., Trenton, N. J.

HEATER CORD—General Electric Co., Mfr., Schenectady, N. Y.

HEATER CORD—Okonite Company, The, Mfr., Passaic, N. J.

HEATER CORD—Philadelphia Insulated Wire Co., Mfr., 200 N. Third St., Philadelphia, Pa.

HEATER CORD—Standard Underground Cable Co., of Canada, Ltd., Mfr., Hamilton, Ontario, Can.

HOLLOW METAL FIRE WINDOW FRAMES—Lee & Son Co., Thomas, Mfr., 128-32 W. Second St., Cincinnati, O.

INDUSTRIAL AND LABORATORY HEATING APPLIANCES—Mergenthaler Linotype Co., Mfr., 29 Ryerson St., Brooklyn, N. Y.

INSULATING MATERIALS—Asbestos Wood Co., Mfr., Nashua, N. H., Johns-Manville, Inc., New York, Sole Agents.

INSULATING MATERIAL—Fibroc Insulation Co., Mfr., Valparaiso, Ind.

INSULATING MATERIAL—Parker & Son, Inc., J. H., Mfr., Parkersburg, W. Va.

KNIFE SWITCHES—Connecticut Electric Mfg. Co., The, Mfr., Bridgeport, Conn.

KNIFE SWITCHES—Gordon Electric & Mfg. Co., Mfr., Waterville, Conn.

KNIFE SWITCHES—King-Craymer Electric Mfg. Co., Mfr., 32 Haviland St., South Norwalk, Conn.

LAMP GUARDS—Benjamin Electric Mfg. Co., Mfr., 120-128 S. Sangamon St., Chicago, Ill.

LIGHTNING ROD—Devoe & Son, A., Mfr., 36½ Elizabeth St., Auburn, N. Y.

MEDIUM BASE RECEPTACLES—Harter Mfg. Co., Mfr., 522 S. Clinton St., Chicago, Ill.

MEDIUM BASE RECEPTACLES—Pass & Seymour, Inc., Mfr., Solvay, N. Y.

MEDIUM BASE SOCKETS—Benjamin Elec. Mfg. Co., Mfr., 120-128 S. Sangamon St., Chicago, Ill.

MEDIUM BASE SOCKETS—General Electric Co., Mfr., Schenectady, N. Y.

MERCURY INDICATING GAUGE—Pneumercator Co., Inc., Mfr., 15 Park Row, New York, N. Y.

MOGUL BASE SOCKETS—Benjamin Elec. Mfg. Co., 120-128 S. Sangamon St., Chicago, Ill.

MOGUL BASE RECEPTACLES—Pass & Seymour, Inc., Mfr., Solvay, N. Y.

OUTLET BUSHINGS AND FITTINGS—CABLE SUPPORTS—Russell & Stoll Co., Mfr., 17-27 Vandewater St., New York, N. Y.

OUTLET BUSHINGS AND FITTINGS—Thomas & Betts Co., Mfr., 63 Vesey St., New York, N. Y.

OUTLET FITTINGS—Utility Fittings Co., Submittor, 1932 E. Westmoreland St., Philadelphia, Pa.

OUTLET PLATES—Appleton Electric Co., Mfr., 1701 Wellington Ave., Chicago, Ill.

OUTLET PLATES—Hope Foundry & Machine Co., Inc., 353 Boyden Ave., Hilton, N. J.

OUTLET PLATES—Michigan Stamping Co., Mfr., Detroit, Mich.

PANELBOARDS—Robertson Elec. Construction Co., Mfr., Mohawk & Niagara Sts., Buffalo, N. Y.

PLUG FUSE CUTOUT BASES—Armstrong & White, Mfr., Pittsburgh, Pa.

PLUG FUSE CUTOUT BASES—King-Craymer Electric Mfg. Co., Mfr., 32 Haviland St., South Norwalk, Conn.

PLUG FUSES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

PLUG FUSES—Mesa, Fernando C., Mfr., Irvington, N. J.

PLUG FUSES—Osterhout Electric Co., Mfr., 1013 Race St., Philadelphia, Pa.

PUSH FLUSH SWITCHES—Chelten Electric Co., Mfr., 4859 Stenton Ave., Philadelphia, Pa.

PUSH FLUSH SWITCHES—Hubbell, Harvey, Inc., Mfr., Bridgeport, Conn.

PUSH FLUSH SWITCHES—Machen Electric Mfg. Co., Mfr., 4639-43 E. Thompson St., Philadelphia, Pa.

PUSH FLUSH SWITCHES—Ward Electric Co., Submittor, 1411 Walnut St., Philadelphia, Pa.

PUSH AND ROTARY FLUSH SWITCHES—MARINE—Benjamin Electric Mfg. Co., Mfr., 120-128 S. Sangamon St., Chicago, Ill.

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Fires and the Housing Problem

(Drawn for "Safeguarding America Against Fire" by Hollis Kirby.)

SAFETY ENGINEERING is indebted to "Safeguarding America Against Fire" for this striking symbolic picture.

No wonder Columbia looks appalled—for she has the Housing Situation to consider.

Mr. T. Alfred Fleming, Supervisor of the Conservation Department of the National Board of Fire Underwriters, says "We are burning 898 homes every working day."

In the January number of Safety Engineering it was pointed out by C. E. Worthington of Boston that "housing is expected to be provided during 1921 for about 5,000,000 families; that the new structures designed for single dwelling occupancies and small tenements for three families or fewer will call for about 3,000,000 buildings at an average cost per house of $4,000, or a total cost of $12,000,000,000."

The National Board of Fire Underwriters says that the $1,416,375,000 representing five years' fire waste in the United States, "would have built 283,275 new houses at an average cost of $5,000 each, thus supplying homes for 1,416,375 people. This exceeds the total population of Connecticut."

In 1919 the fire-casualties were 15,219 persons killed and 17,641 injured.

Measures for reducing the Needless Sacrifice of Human Life and Property by fire are advocated by the N. F. P. A. (See page 267).

Ignitions of Combustible Materials, Especially Exposed Woodwork, by Heat-Producing Apparatus

By C. E. Worthington
Wellesley Hills, Mass.

THE endeavor to provide a reasonable approach to immunity from ignitions of combustible material, particularly woodwork exposed to heat-producing devices and apparatus, by covering exposed surfaces with non-combustible materials has not achieved complete success. The failures are not general but they are too numerous, by far.

The best fire protection is the result of forethought applied during construction.

This is practicable in many cases, but not practicable when a foreknowledge of eventual conditions is impossible (as in buildings whose occupancies are uncertain or subject to change) and when the location of heat-producing apparatus may not be predetermined.

WHY DO SO FEW PEOPLE EXPECT FIRES IN THEIR OWN PREMISES?

Fire is a calamity few people consider in advance. The possibility that fire may *affect them* seems remote. An exemplification of this feeling is afforded by an actual case which came under the author's notice. It happened that each individual owner in a long row of semi-detached dwellings applied to the same insurance agency for insurance. *Each owner declared that his own property was so safely built and guarded that he would not consider insuring were it not for fear of fire from the adjacent dwellings.*

To some extent this may serve to explain why the construction of buildings (embodying easily preventable, inherent fire hazards) goes merrily on and why the national fire waste does not diminish.

OPPORTUNITIES FOR ARCHITECTS IN DETAILS OF FIRE-SAFETY

Presumably, the architectural profession is to be thanked for the shift in public taste evinced by the successive abandonment of the imitation mansard roofs of 1860, the peaks and pinnacles of 1880 and the growing favor of the Dutch Colonial of today—a better recognition of the true beauty of the simple, the desirable and the useful. So much having been accomplished in promoting beauty of outline the hope may be expressed that there may now, or soon, be a chance to interest architects in the minor details of safety.

Consider the matter of fire stops at floors. Undeniably they add to cost, but the addition is slight and so far outweighed by other considerations that every well-prepared building ordinance compels them. Where there is no compelling law, the proportion of dwellings built with good fire stops is next to negligible.

In dwellings, apartment houses and some other buildings the location of heat-producing apparatus (heating and cooking) is usually determinable in advance with considerable accuracy. In these buildings, obviously, danger to life is present. Holocausts that cause, for a day, the sensation called "horror" (and sometimes bring remedial measures) may not be regarded, but the steady procession of fire-deaths, by one's, two's and three's, looms large in the ultimate total. Coming in driblets they arouse little attention. Possibly the public has grown to regard these deaths as unavoidable. In the main, they are nothing of that sort.

MINOR AREAS SHOULD BE MADE ABSOLUTELY NON-IGNITIBLE

We have not yet reached the point where construction of these classes of buildings, in a completely fire-resistive

manner, is economically practicable. Nor is it possible to foresee all things. Nevertheless it is feasible, at nominal cost, or no added cost, to construct certain parts of buildings exposed to conditions favoring fire so as to prevent many fires and to diminish, largely, the mortality from fires. We may not do away altogether with the need for superficial protection but that need can be nearly eliminated by *making minor areas absolutely non-ignitible.*

THE HANDIWORK OF IGNORAMUSES TOO MUCH IN EVIDENCE

The methods in vogue for superficial protection have not been as uniformly successful as could be desired, not because the materials were not of proper character, but because of hasty or inadequate installation, by "handy men" or others having little knowledge of the nature of heat or of its effects. To be fairly effective such protection requires proper materials, chosen to suit the particular case, and installation in a manner calculated to secure the desired results.

A WORKING KNOWLEDGE OF THE PHENOMENA OF HEAT

For the present purpose the precise nature of heat does not concern us. But if we are to devise protective measures against its effects a rudimentary knowledge of the ways in which these effects are manifested is useful information.

A heated body is in a state of rapid vibration (that is the molecules composing it are). A body heated or in combustion parts with heat in a manner to produce heat or combustion in other substances. This is termed radiation and, primarily, all transmitted heat is radiated heat. But we may recognize three modes of actual transmission—radiation, conduction and convection—each requiring to be met in a different manner.

Radiation. This is a term applied to heat emitted to and through a surrounding medium that is more or less penetrable, such as air, a theory being that it is a succession of waves or rays propagated through the ether by which the molecules of air are separated. (Now the existence of ether is denied, but no substitute theory is offered. So any guess is good enough for this article.)

Theoretically, radiation takes place in all directions from a given point, not considering obstructions, and diminishes in intensity, mainly by attenuation, as the square of the distance increases. This, however, is theory. Although in the case of a completely isolated spherical body it would be strictly true if that body were suspended in "ether," possessing no gravity or intercepting power, such a condition does not exist, for practical consideration, and the theory applies, fully, only to heat emitted in a horizontal plane through a uniform obstructing medium. When heat is emitted vertically, radiation, of course, is the same, but only theoretically, since it becomes involved at once with modes of transmission.

The heat rays, in effect, are continuous and, so far as any distances with which we have to deal are concerned, move in straight lines. They may be deflected or reflected by bodies not completely pervious, but they will refuse to deviate from the straight line except under compulsion.

The power to absorb, deflect or reflect these rays is possessed by all ponderable bodies in varying proportions, no known substance being capable of completely reflecting, absorbing or deflecting them. So exposure results in the exposed body's becoming eventually heated, presumably by the impact of the vibrations, as by repeated hammer blows.

Conduction. This signifies a method of heat transmission where substances in contact with the heat-producing body take up and convey the rays or vibrations within their own substance, eventually disposing of them by radiation or otherwise. The actual process of heat transference by conduction is the same whether the conducting body is in actual contact or otherwise, but for the purpose of this article the distinction, although involving no real difference, is convenient.

Convection. This signifies that heat is conveyed by means of molecules absorbing heat, repelling adjacent molecules and rising—the method by which fluid substances become heated.

A dangerous degree of heat may be

conveyed to an ignitible material by any one of these methods, or more than one may operate in conjunction. On the other hand, these three methods of heat transference may be utilized, singly or in combination, as a means of protection. And, since heat once generated may not be destroyed except by exhausting its energy, mainly by attenuation, protective measures must be confined, usually, to seeking means to divert it, in some direction, so it can be dissipated harmlessly.

DRY WOOD PROTECTION MAIN PROBLEM

Dry wood is generally the most combustible substance we are called upon to protect. The minimum temperature at which dry wood will ignite immediately by contact with a heated body is above 500° F. but a much lower temperature, long continued, will produce ignition, the period varying with the duration of the subjection to heat.* Cases have been reported of actual ignition from long continued exposure to 212°, which is in all probability the lowest danger point, or would be if the disposition of non-conducting bodies, under some conditions, to accumulate heat did not exist. Therefore, we may assume that real hazard of ignition may begin at a slightly lower temperature than 212°.

Combustible materials like wood possess little power of heat reflection or conduction, in consequence of which the heat received is retained and accumulates until the point of ignition is reached. Therefore, in selecting protective materials, we should look for those possessing different qualities, such as high powers of radiation, conduction and reflection.

We must bear in mind that no known substance is capable of either absorbing, conducting away or reflecting *all* of the heat waves which may be directed against it and that saturation is only a matter of time and of the intensity of the heat. Only by properly applying these facts can any considerable degree of protection be achieved.

Of non-combustible materials, metals reflect heat and are good conductors and radiators. Concrete and brick are good reflectors, diffusing heat throughout their substance very slowly. Air, which is somewhat of a paradox, will absorb, so far as the individual molecules are concerned, an enormous amount of heat which it does not readily part with; hence, if imprisoned in very small cells or spaces, it becomes an excellent insulator by mere heat absorption; on the other hand, if free to move, it carries away a very large amount by convection.

*if intermittent.

THE AIR SPACE AND OTHER METHODS FOR PROTECTION

Many writers declare that an air space is absolutely indispensable, a correct enough statement if interpreted to mean that actual contact with a heat producer is never permissible. Otherwise it is misleading. A moment's reflection will serve to convince one that air spaces large enough to protect, by mere isolation and space, and thus allow sufficient attenuation of heat, are rarely obtainable. We must consider some other method.

Nevertheless, *some* space is necessary, and our task, usually, is to increase the efficiency of the space as its dimensions decrease. We cannot always regulate the distance between a heat producer and wood. Also conditions differ. Is the protection to be overhead against heat by combined radiation and convection? At the side against radiation interrupted by convection? Or underneath against almost uninterrupted radiation?

When the heat-producer is an object of fairly uniform size, extending vertically to the external air, a complete solution is not difficult. We know that air molecules, crossing the paths of heat rays in an intersecting plane, absorb and convey away part of the heat. Consequently, if we increase the velocity of the air, we carry away more heat, proportionately. Upon this principle all air-cooled apparatus is constructed.

Now, if we restrain a column of air so as to direct it wholly upward it responds automatically, answering an increase of heat by acceleration. So, to get protection, we have merely to enclose the air-column surrounding the heat-producer by some material (galvanized iron, for instance) that will restrain expansion and

lateral currents and reflect back a large part of the heat to increase air velocity, disposing of excess heat by absorption and radiation.

Certain conditions are required to make this effective. The air space must be correctly proportioned, since if too large we shall not get proper velocity, if too small the air movement will be retarded and the heat will not be carried away fast enough. It is essential that there be unobstructed egress of air at the top, an area large enough in excess of the cross section area of the air column to take care of expansion, and also unobstructed ingress at the bottom.

The application of this principle is best shown by the cut of a method of protecting iron smokestacks that has proved entirely satisfactory. (Fig. 1.)

This spacing was determined mainly by experiment; that which seemingly gave the best results was used. It could be made a little more efficient, perhaps, in exceptional cases by increasing the outlet area at the top, and putting on a flaring bottom or base to further increase the volume of air. In exceptional cases an intermediate cylinder, forming a second air space, has been used as a factor of safety, but the necessity is open to question.

The reliance is mainly upon a moving air column. Since a flat plate about a stack and approximately in contact does not permit of that, attempts to secure protection in that manner are doomed to more or less failure even though the space from stack to wood be increased several times.

HEAT REFLECTING SHIELDS AND SHEATHING OF WALLS

When the object—a heating stove, for instance—is set comparatively low and an external vertical vent for heat is not practicable, resort must be had to reflecting material; if the stove gets very hot, a double air space should be provided by means of a shield.

This is not a very efficient plan but it is probably the best that can be done to protect a vulnerable wall. The shield should be of material that reflects heat—galvanized iron or cement board. It should rest upon incombustible supports. The distance from bottom of shield to floor must be at least as great as the distance from shield to wall; the distance to ceiling must be much greater. In no event should the shield approach the surface to be protected so closely as to permit ordinary combustible material, like paper, to become lodged behind and in

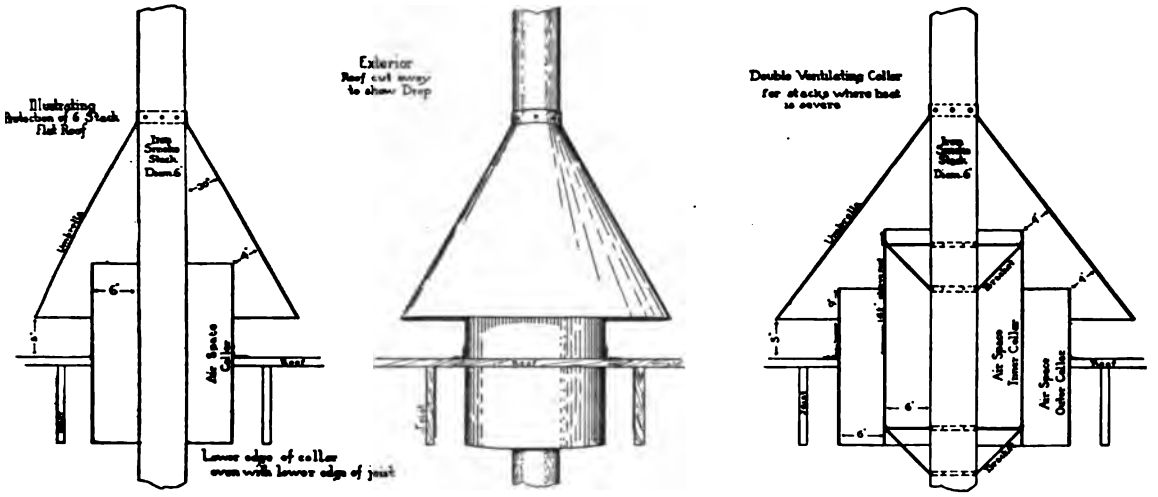

Exterior
Roof cut away to show Drop
Double Ventilating Collar
for stacks where heat is severe
Air Space Inner Collar
Air Space Outer Collar
Lower edge of collar even with lower edge of joist

Fig. 1. Protection for Metal Smokestacks

contact with it. A distance of two inches to wall (often specified) is usually insufficient and is productive of accidents.

The surface of wall must be sheathed. It is often desirable to use a sheathing of high conductivity and large area. In any event sheathing should fit the wall closely, without air space behind it, and extend to the floor.

Amateur attempts at protection have produced much trouble. Obviously a few sheets of wrinkled and distorted metal, loosely tacked against the wall, afford very little protection. The job should be well done or not done at all.

The class of heating stoves using anthracite, known as base burners, do not usually develop the same intensity of radiation at points of concentration and may be more leniently dealt with, as a rule, than ordinary cast iron or sheet iron stoves, but none of them should approach within three feet of an unprotected combustible surface; often three feet is unsafe without thorough double protection. On the other hand stoves that have thick clay linings (Franklin stoves and cooking ranges of usual domestic size) project the greatest heat to the front, or vertically, and, therefore, sheathing-in generally suffices if distances are not less than 18 inches.

"DELIVERY OF HEAT WAVES IS BY A SERIES OF BLOWS"

Athletes eminent in a profession that involves much danger of personal injury make their fists protect their faces. As, in a way, the delivery of heat rays is by a series of blows it will be seen that if there can be interruption near their origin we are apt to get better results. Undelivered blows, whether by fists or by heat rays, are never dangerous.

It is well to remember that where the delivered heat is intense and concentrated in a small area so as to produce an effect analogous to the concentrated heat of a blow pipe, the chances are decidedly against the successful use of anything but an air surrounded shield; and that, in applying material designed to carry away and radiate heat, the area of protective material should exceed considerably the area of direct heat exposure. In all such cases the use of thin pliable sheets tends to avoid wrinkles and spaces and to prevent nails from pulling out.

The best we can do, however, in the way of special makeshift devices, is a poor substitute for wholly incombustible construction.

OVERHEAD PROTECTION BY INSULATION AND BRIGHT TIN, LOCK-JOINTED

Here is a new problem since convection, instead of interrupting heat transmission, comes to the aid of radiation. We have a double transmission to meet, enhanced by the effect of the rising column of hot air drawing reinforcement from the surrounding air. We say "heat rises," but heat does not rise. On the contrary, it follows strictly the line of projection, whatever its direction. Material bodies, interposed in the line of projection, absorb heat, expand and "rise"—heated substances, not heat.

Generally, effective vertical ventilation is impracticable, while the conditions permitting lateral ventilation are at best indifferent. The process consists of hot air rising and slowly spreading out, the heat at the central point always being comparatively excessive.

In these cases if the emission of vertical heat can be in a measure prevented, it is unquestionably better than permitting the heat to escape and trying to fight it later.

Furnaces and boilers in dwellings generally come too near to ceilings for complete safety. They may be safe enough at first, under ordinary conditions. Later, as "drying out" proceeds, they are liable, under emergency speeding up, to become dangerous.

Hence, since the heat evolved is never very severe, the better plan (economically correct also) is to cover the top of the furnace casing or boiler with heavy insulation, 3 or 4 inches thick.

The smokepipe of a furnace, frequently entering the chimney very near the ceiling, often presents the point of greatest hazard. If the exposure is wholly overhead, saddling the upper half with thick insulation is the most efficient way (Fig. 2); but if the smokepipe passes too near wood at the sides, complete enclosure is desir-

able. Usually this method is less costly than any other.

If the protection of the ceiling is decided upon, such protection, if metal, should be preferably of bright tin, lock-jointed, following closely the surfaces of the wood, without air spaces. If carried across the joists some effective heat insulator like hard plaster on expanded metal should be used, and the channels between joists at the edges of the plastering protected, to prevent dust, paper, etc., from finding entrance. A metal covering across the joists is not recommended whether fastened directly to joists or underhung, since, obviously, the effect obtained by a vertical air-surrounded shield, with active air circulation behind, cannot be realized.

The tin heat-conducting pipes are often a source of danger and require insulation, not by wrapping in ordinary thin asbestos paper (which is no insulator at all), but by real insulation ⅜ inch or more in thickness.

Here safety and economy coincide. The lost heat of these pipes is simple waste when discharged into the cellar, where it is not needed, instead of into the rooms above where it is needed. This waste sometimes approaches 50 per cent of the furnace capacity, so that the saving of coal may become a very material consideration. The insulation should be continued up to the soapstone register boxes. These pipes, when over three inches away, do not endanger woodwork at the side; but overhead, if uninsulated, at least one-half of pipe diameter should be the minimum of clearance.

This applies also to small steam pipes, ½ inch to 1 inch at sides usually being safe where there is free air circulation; but if they are beneath joists, timber or other wood, there should be a minimum of two inches clearance for small pipes and not less than a diameter of the pipe for larger sizes, irrespective of pressures or whether live or exhaust steam. Generally these pipes are insulated for economy's sake, except that exhaust pipes, giving off waste heat merely, do not always get proper attention.

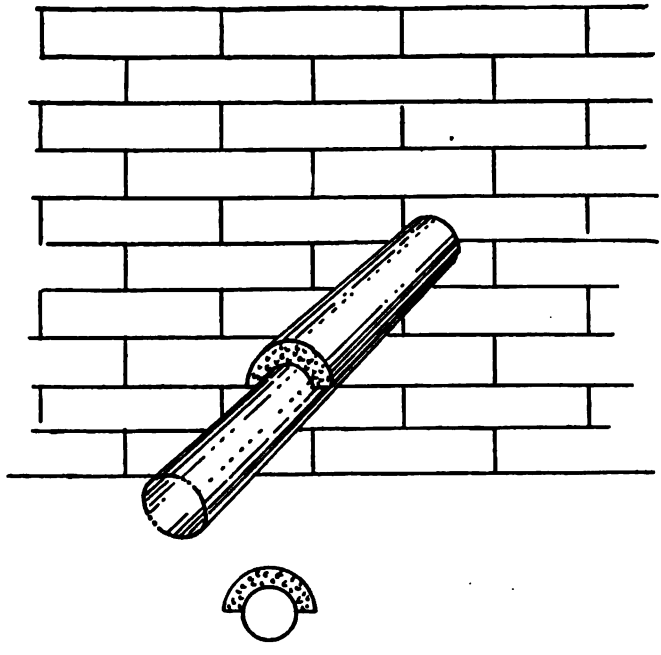


Fig. 2. Cross Section of Saddle Insulation for Smoke-Pipe

Above open fires or where there is opportunity for delivery of sparks the complete continuity of the protective material is of much importance. Great stress may be laid here upon the need of carefully avoiding "lapped" joints or any openings through which sparks may find their way behind or above the protecting material. It may be emphasized, again, at the possible risk of undue repetition, that lapped metal sheets, secured by nails driven through with heads exposed, cannot and will not afford good protection nor remain tight and in position.

CASES IN WHICH VENTILATION IS A MOST IMPORTANT FACTOR

There is one condition of overhead exposure to heat that cannot be remedied

or even greatly mitigated by the use of protective sheathing or heat resistants. That is where the exposure is in an unventilated space, as over a boiler.

Air absorbs heat greedily and parts with it reluctantly. Consequently if there is no escape for the heated molecules, air can become very hot by accumulation. There is at least one instance on record where a boiler covered with several inches of good insulation, and several feet below a thick concrete slab floor (concrete is one of the best of heat resistants), finally heated the concrete slab to such an extent that combustible material on its upper surface ignited. There is no substance that will permanently resist the effect of accumulated heat in such a space. The only remedy is ventilation, the admission in some manner of an ample volume of air from an external source and adequate escape or removal of the heated air. In such cases, if natural ventilation is unobtainable, forced ventilation by mechanical means must be resorted to.

The difference in temperature between the top and bottom of an unventilated space is sometimes astonishing, although easily explained by natural laws. Unfortunately, however, the top of such space is rarely visited or examined and dangerous conditions may easily exist all unknown. Therefore, wherever there is a known condition favoring the accumulation of highly heated air, ventilation should be provided.

Such heated air, if permitted to escape by a restricted vent, may be dangerous. Strong currents of air as low as 350° F., or possibly less, impinging at an angle upon combustible material, have been known to produce ignition, such as on "deflector boards" in textile mill dry-rooms, and on sawdust and the like in angles and corrugations of heat conducting pipes. Hot air delivered through small cracks in furnace or kiln linings has likewise proved a source of danger.

One such instance was in an enamelling oven, where a small crack in the 12 in. concrete floor permitted a strong jet of hot air to impinge upon a beam some distance below the floor, resulting in a fire. Air, expanded by heat, develops high pressures (hot air engines) and where expelled through small vents is expelled often with much force.

UNDERNEATH EXPOSURE WITH PARTICULAR REFERENCE TO BRICK, CONCRETE AND HOLLOW-TILE PLATFORMS

In situations like this we have, generally, transmission by mere conductivity and radiation. And it may be repeated here that there is no resistant that will not in time, if exposed to continued heat, develop approximately the degree of the exposing heat. Since this can be produced in brick or concrete in an exceptionally hazardous way because of low conductivity (slow transmission) the central part of a slab may become much hotter than its edges.

With good air space venting on several sides, as in the usual stove or domestic range, there is little trouble in taking care of the hazard by a sheet of metal, but where the heat is delivered by contact or through a small unventilated space, platforms of brick and concrete have developed numerous failures.

The favorite idea is to construct such platforms of hollow tile or brick so laid as to provide continuous horizontal air channels through the platform. This has not been nearly as successful as could be desired.

Perhaps the principal reason is that the temperature and air pressures at both ends of these channels are practically the same. Consequently the only ventilation is afforded by the air at the top of the channel pushing out by expansion, but not rapidly enough to prevent dangerous heat accumulation.

It is suggested (there is no record of actual experience) that if the channels in such a platform be connected by a cross channel closed at both ends, the cross channel piped to the outer air with the mouth of the pipe turned down, the excess of pressure within the building would induce sufficient draft to keep the interior parts reasonably cool.

In such case the outer end would be in a cooler place and the mere difference of pressures, aided by condensation which would to some extent produce a vacuum in the outer end, should produce a good result.

As a means of drawing off the heavier

and cooler vapors near the floor, this method, not only providing better ventilation for the room but drawing down the warmer air from above and thereby conducing to warmer floors, would seem to possess considerable theoretical value. If properly constructed the entrance of exterior air through the vents would be impossible as long as the interior was in the least degree warmer than the outer air.

Otherwise, unless these channels can be cross connected and a forced draft maintained by mechanical means, we shall have to take them as they are and for what they are worth, risking failures to protect, or resort to sections of completely noncombustible resistive floor. The percentage of failure is not large, as it is.

Of course, there are types of furnaces and the like where a simple 4-inch concrete slab will protect, but there are other types where that is by no means dependable.

THE FORMULATION OF DEFINITE AND EFFECTIVE RULES

In an article of this nature, it is impracticable to discuss at length the properties of heat from a technical standpoint or to produce within permissible space anything that can be set down as final authority. Neverthless, there is so much misunderstanding of fundamental principles that a review of this nature may prove of value and may afford a basis for a more elaborate and conclusive analysis.

It is a fact that much of the so-called (superficial) fireproofing, applied by amateurs, is radically defective, failing to give the desired protection. Installed in defiance of correct principles and natural laws, without appreciation of the value of small details, which often appear insignificant, it is foredoomed to failure.

This article has not been written for the purpose of formulating rules or to lay down inflexible laws, but rather to direct attention to a neglected subject; to attempt, crudely perhaps, to aid in the formulating of future definite and effective rules.

Most of the theories of heat, particularly of heat propagation, are no longer theories but accepted facts. There is, however, much to be learned regarding the precise manner in which some effects are produced, but we are gradually discovering the causes that underly such effects. And some improvement is possible in methods of applying what we already know.

Mine Injury Rate in South Africa

THE fatal accident rate for 1920, as reported on March 12, 1921, in a speech by John Munro, chairman of the Prevention of Accidents' Committee of the Chamber of Mines, referring to Witwatersrand gold mines, was 2.45 per 1,000. In 1910 it was 4.21.

"These figures are gratifying," he said, "when compared with the rate of the United States, where fatal accident rates for 1917 are as follows: All mines, 4.44 per 1,000; coal mines, 4.25 per 1,000. Although the improvement so far achieved is excellent, there is still plenty of room for far better results when compared with the rates for the United Kingdom, which for coal mines for the year 1919 was 1.39 per 1,000, and the New South Wales rate for the same year which for coal mines was 0.649 per 1,000, and other mines 0.762 per 1,000."

The causes of the 486 death-producing accidents in 1920 were as follows:

Falls to ground.....	33 per cent
Falling of material.....	16 " "
Trucks and tramways	11 " "

L. G. Ray, Assistant Inspector of Mines, analyzing the lower rate, says:

"Let me point out that but for the very marked improvement in the death-rate from explosive accidents, we should be very little further forward than we were in 1914."

N. F. P. A. Officers' and Committees' Reports

IN synopsis form, SAFETY ENGINEERING presents below the reports of the officers and committees of the National Fire Protection Association submitted to the San Francisco meeting.

The association is fortunate in having represented in its membership the mutual as well as the stock companies, and President Mallalieu said that each group of underwriters has "always unreservedly placed all of its rich engineering experience in fire protection at the service of the association." Societies of architects, engineers, credit men, manufacturers, electricians, and State and city officials have also co-operated, earnestly and intelligently, in the cause of fire prevention.

The very brief outlines of the scope and recommendations of the committee reports that follow comprise the suggestions of the several committees. The action taken by the association upon the reports is related in the report, elsewhere, of the discussions and proceedings at the San Francisco meeting.

PRESIDENT'S ADDRESS

Opening the twenty-fifth anniversary meeting of the National Fire Protection Association, President Wilbur E. Mallalieu recalled the progress made in fire prevention since the first small meeting in 1896.

"Out of the beginnings of all collective effort usually shines the spirit of a man, and it requires no special scrutiny of the early years of our own association to disclose a figure imposing, devoted and serene; a man of character and quiet initiative; capable of winning men to our unselfish co-operation in a public work. The name of Uberto C. Crosby is indelibly written into the records of the National Fire Protection Association's first years of life, and his influence and character established our organization upon foundations that gave to it permanence and strength."

Notwithstanding the constantly increasing power of fire prevention and the growing prestige of the prevention idea, President Mallalieu said that "from present indications, the 1920 fire waste will run in excess of $500,000,000." The 20 States whose fire losses have been compiled for 1920 show losses 60 per cent greater than those of 1919, indicating an aggregate loss for 1920 nearly as large as that of 1906, which included the great conflagration of San Francisco.

"But we have to-day reliable evidence," said President Mallalieu in conclusion, "that the foundation has been laid for a more sane and careful North America, and I am firm in the belief that the unhappy waste which has marked this continent for so many years will soon be reasonably abated and that the millions annually thus saved will express themselves in more substantial and beautiful mills, factories, workshops and homes and a happier and more contented people."

SECRETARY AND EDITOR

The publications issued from the Executive Office during the year were reported as follows: News Letter, 55,000 copies, in the 12 numbers; Proceedings, 5,200 copies; Year Book and Membership Directory, 5,000 copies; *Quarterly*, 20,000 copies, in the 4 numbers.

In addition to the publications issued by the association itself the president secured also the distribution to the association's membership of the monthly journal of the National Board of Fire Underwriters, *Safeguarding America Against Fire*, which reports the fire waste statistics collected by the Actuarial Bureau of that organization.

"Field Practice," the inspection manual published in 1914, is under revision, and a new edition is to be out in early fall.

MEMBERSHIP COMMITTEE

Since May 1, 1920, the annual dues were raised to $10 a year, which prob-

ably accounts for a part of the decrease in membership of 11 active and 355 associate members, which is in each case about 9 per cent loss from last year's total. Included in the list of members on May 1, 1921, were 124 active members and 3,869 associates, including the year's 522 new enrolments.

The committee is aiming at a membership of 10,000, and feels that the 522 new members enrolled this year indicate the possibility of growth when conditions become normal, and testify "to the fact that present membership dues are considered quite satisfactory in amount by those who are actually interested in service."

COMMITTEE ON PUBLIC INFORMATION

Subjects considered at the request of the executives were as follows:

Campaign for Exclusive Use of the Strike-On-Box Match. This campaign was reported unfavorably, because of the inferiority of the splints and consequent danger of the match considered.

Distinguishing Mark for Slow-Burning Motion Picture Film. This measure received the favorable attention of the committee, and its consideration was continued. The largest film manufacturer in America has voluntarily acted in this matter, engaging to mark all films produced on slow-burning stock, at 17-inch intervals along one of the perforated edges, as "Safety Film."

Campaign Against Smoking In Factories. The committee felt powerless in this matter, and asked discussion and suggestions. The tobacco manufacturers it regarded as the proper source of co-operation, but they have shown themselves entirely indifferent in the matter, even when approached by the United States Secretary of Agriculture.

Preparation of a Booklet of Suggestions for Factory Fire Prevention Signs. This seemed to the committee to involve valueless duplication of the work of firms now prepared to furnish signs and illustrated catalogues of them. That a list of such manufacturers be published in the News Letter was the committee's only recommendation.

Publications circulated by the committee during the year were as follows:

Regular bulletins.

Pamphlet of model laws and ordinances.

"Fire Protection for Hospitals, Asylums and Similar Institutions," by H. Walter Forster. (13,000 copies printed.)

"Precautions Against Freezing of Fire Extinguishing Appliances." (37,000 copies circulated.)

Christmas Holiday Fire Warning. (40,000 copies issued.)

Independence Day Bulletin. (13,000 copies issued.)

"Structural Defects Influencing the Spread of Fire." First published by the Committee on Manufacturing Risks and Special Hazards, and revised at the request of the Committee on Public Information. (15,000 copies published, 5,000 circulated.)

"Woman's Part in Fire Prevention." (5,000 reprints circulated.)

"The Evil Wooden Shingle." (10,000 copies distributed on request.)

"Protection of Wall Openings." (10,000 copies reprinted.)

A nitro-cellulose motion picture film has also been in circulation by the committee, continued from the previous year. Much work in this field has been done by the National Association of the Motion Picture Industry, a co-operating member of the N. F. P. A.

A systematic but so far not successful campaign was conducted by the committee to secure legislation fixing upon persons disobeying fire prevention orders the cost of extinguishing preventable fires.

COMMITTEE ON LAWS AND ORDINANCES

The report of this committee consisted in a revision of the form of Suggested Ordinance Regulating the Use, Handling, Storage and Sale of Inflammable Liquids and the Products Thereof, adopted at the 1913 annual meeting. The points of revision consisted mainly in the omission of sections on garages and dry cleaning establishments, and changes to harmonize the proposed ordinance with last year's Regulations for the Storage and Use of Fuel Oil and for the Construction and Installation of Oil Burning Equipments.

The main sections of the revised form were: General (relating to definitions, permits, inspections, modifications, etc.); General Requirements for the Storage, Use and Handling of Inflammable Liquids; Storage Tanks—Capacity, Location and Restriction; Piping and Other Appurtenances; Petroleum; Paints, Var-

nishes, and Similar Manufactured Commodities; and Penalties.

COMMITTEE ON AUTOMATIC SPRINKLERS

Section H—Dry Pipe System and Fittings, of the Regulations Governing the Installation of Automatic and Open Sprinkler Equipments, edition of 1920, was recommended for revision throughout.

The important changes urged were in size of dry system, subdivision of system, location and protection of dry pipe valve, air compressor capacity, independent automatic air filling connections, and drain valve to be provided when more than 20 sprinklers do not drain back.

COMMITTEE ON MANUFACTURING RISKS AND SPECIAL HAZARDS

Section of report dealing with Spreading and Mixing Hazards in Rubber Mills and Like Industries: The committee's suggestions on construction related to size and arrangement of rooms, or of building if a separate building can be had, the construction of walls and roof, and the necessity of cut-offs and exits.

For ventilation the natural method is favored, and the floors should be above grade to facilitate the drainage of gases by pipes to the air outside. Fans should be avoided if possible, and kept outside the process rooms if they must be used.

The handling of volatile liquids should be entirely by approved devices, mainly by special pumps and pipes draining backward and downward into underground tanks.

Solvent recovery systems should be designed to handle a volume of air large in relation to the inflammable gases, and their location should be in a detached building, fireproof, but recognizing the probability of an explosion inside it.

All metallic parts should be grounded. Belts, trucks and other moving machinery should be eliminated when possible, and run at low speed when necessary. Electrical equipment should also be kept to a minimum, and its wiring in conduit, with fixed lamps, and a main switch outside the building.

Humidity must be kept at not less than 4 and not over 7 grains of moisture to a cubic foot. The method is not important, and in summer usually the natural humidity is sufficient.

Safety appliances should include steam hose under moderate pressure, two types of hand extinguishers, the foam and the carbon tetrachloride varieties, and an automatic sprinkler system with about twice the usual number of sprinklers.

The committee appended to its report an article by F. J. Hoxie, engineer, on "Fire Prevention in Rubber Spreader and Churn Rooms." Mr. Hoxie credited to static electricity a majority of the fires in spreader and churn rooms, and said that about three-quarters of these fires occur in the winter, which would give an indication that humidity prevents many in the summer. "The chief source of fire is the electrostatic capacity of the bodies of the men," and only humidity can prevent them from retaining charges of electricity.

Section of report dealing with Regutions for the Protection of Fire Hazards Incident to the Use of Volatiles in Manufacturing Processes: Basing its report on data collected for the last 12 years, the committee's suggestions covered dip tanks used in manufacturing processes, quenching tanks used in heat treating departments, flow coat work and its paint supplies, paint spraying and spray booths, automatic drains, automatic covers, the drying and baking hazards of japanning, enameling and lacquering, and general rules covering all foam extinguisher systems, except for the protection of tanks having an area of over 10,000 square feet.

The regulations for the use of foam extinguishers stipulated that foam producing liquids must not be readily subject to deterioration and must produce a tenacious foam of non-combustible gas; that solutions must be stored in suitable tanks and at suitable temperatures; that they must be supplied by specified types of pumps or gravity tanks; and that mixing devices and discharge outlets be part of the equipment.

Three classes of foam systems were made, as follows:

Class A. Systems for outdoor hazards.

Class B. Automatic systems for hazardous rooms and buildings not adapt-

Needless Sacrifice of Human Life and Property

Resolutions Adopted by the National Fire Protection Association, San Francisco, June 14, 1921

IN its warfare against the needless sacrifice of human life and property by fire the Association advocates the following measures:

1. The adoption by municipalities of the Standard Building Code of the National Board of Fire Underwriters to the end that fire-resistive building construction may be encouraged, the use of inflammable roof coverings prohibited, adequate exit facilities from buildings assured, and interiors so designed and fire-stopped as to prevent or materially retard the development and spread of fire therein.

2. The adoption by all States and Provinces of minimum building requirements for the protection of State, provincial and county hospitals, schools, asylums and similar institutions.

3. The enactment by each State and Province of the fire marshal law advocated by the Fire Marshals' Association of North America to the end that official investigation may be made of the causes of all fires, preventable fires may be eliminated by public education, and the crime of arson stamped out.

4. The adoption of the Association's ordinances providing for the systematic inspection of all buildings by city fire marshals or local firemen to insure the vigorous enforcement of rules for cleanliness, good housekeeping, and the maintenance of safe and unobstructed exits, fire-fighting apparatus and other protective devices.

5. The enactment of ordinances fixing the cost of extinguishing preventable fires upon citizens disregarding fire prevention orders, and a more general legal recognition of the common law principle of personal liability for damage resulting from fires due to carelessness or neglect.

6. The wider general use of the automatic sprinkler as a fire extinguishing agent and life-saver and the more general use of standard smoke-proof towers and of horizontal exits through properly protected openings in fire division walls as important life-saving facilities.

7. A careful study of the technical surveys of cities made by the engineers of the Committee on Fire Prevention of the National Board of Fire Underwriters covering the items of water supplies, their adequacy and reliability, fire department efficiency, fire alarm systems and conflagration hazards, and of the possibility of co-operation among neighboring cities through mutual aid and the standardization of hose couplings.

8. The universal adoption and use of the safety match and legislation prohibiting smoking in all parts of factories, industrial and mercantile buildings except in such fireproof rooms as may be especially approved for the purpose by authorities having jurisdiction.

9. The education of children and the public generally in careful habits regarding the use of fire, and the general adoption by the schools of the United States of the fire prevention manual, "Safeguarding the Home Against Fire," prepared by the National Board of Fire Underwriters for the United States Bureau of Education.

10. The adoption of State and municipal laws and ordinances regulating motion picture displays and exchanges; the prohibition, without a standard enclosing booth, of the use of motion picture projection machines in any building unless the film used is of the slow-burning type, and the ultimate substitution in the manufacture and use of motion picture films of the slow-burning type in place of the nitro-cellulose film.

11. The general prohibition of the discharge or firing of fire-works, fire balloons, or other pyrotechnic display except as a public function conducted by properly authorized individuals under the supervision of officers of the fire departments.

12. The co-ordination of all these activities through a central administrative officer or body of the State, Province or city having primary jurisdiction, for the purpose fo promoting uniformity of action and efficient co-operation.

able to ordinary automatic sprinkler protection.

Class C. Systems for inside hazards in rooms or buildings having other standard fire protection.

COMMITTEE ON FIELD PRACTICE

This committee's report consisted in Regulations Proposed for the Installation, Maintenance and Use of First Aid Fire Appliances. To serve also in classifying fire appliances the fire classification of Underwriters' Laboratories was used, and appliances were thus grouped as (1) Quenching, (2) Blanketing, and (3) Electrically Non-Conducting.

Listed as of the quenching type were certain hand-extinguishers, certain wheeled extinguishers, and hose sets. The blanketing group included certain hand and wheeled extinguishers, sand fire pails and soda-and-sawdust in bulk. Other hand extinguishers fell under the electrically non-conducting classification. Instructions were given for the proper selection, installation, maintenance and use of each type.

COMMITTEE ON SAFETY TO LIFE

The committee recommended for approval a Department Store Egress Code, following the general principles set forth in its 1920 report. In this code the egress requirements were based on area, with strict limitations as to height, construction and protection.

Standards were established for building construction, automatic sprinkler protection, protection of vertical openings, smokeproof towers, horizontal exits, doors and aisles, elevators, escalators and fire escapes. Limitations were placed upon the use of buildings for department store purposes, the ratio of areas to total store population, the number and character of exits and the method of determining stair capacity. A tabulation was made of the ratio of required stairs to actual stair capacity for buildings of different types of construction and varying degrees of exposure and protection.

COMMITTEE ON DOCKS, PIERS AND WHARVES

Believing that from the fire hazard standpoint its report was the first attempt to establish standards, this committee stipulated that it did not feel its report should be adopted except as a progress report, and that it simply referred the important subjects of fire doors and concrete construction to the association.

Specific recommendations for the dimensions of piers were that for widths up to 150 feet fire walls be placed at 200 foot intervals; that when lengths exceed 1,000 feet the pier sheds be divided by an open break of 50 feet at 1,000 foot intervals, and automatic sprinklers and curtain boards be installed; that ceiling heights be limited to 22 feet; and that when piers are over 150 feet wide and accommodate vessels on either side, the pier sheds be constructed in two units with the tracks and driveways between, and the walls facing the driveways be fire walls from mean low water to 3 feet above the roof.

Fire-resistive construction was endorsed for all piling or other substructure above low water, and fire bulkheads for all substructures without retaining walls. Pier floors, fender system, scuppers, concrete walls, fire walls, columns and girders, roof, skylights, stairs, elevators, chutes, escalators, fire hatchways, pier platforms, and rooms with hazardous occupancy all receive attention, for both fire-resistive and non-fire-resistive construction.

For existing piers safety measures recommended included the scraping of piling to remove any oil coating, and its future protection by metal lath and cement plaster between high and low water limits; a fire bulkhead; the protection of steel columns, girders, roof trusses and beams by metal lath and cement plaster; fire walls, skylights, enclosure of stairways, etc., fire hatchways, covered deck openings at 20 foot intervals, and separate or enclosed rooms for all purposes of hazardous occupancy, with reinforced concrete walls at least 4 inches thick. Ventilating openings should close automatically by an approved heat-actuated device.

Piers should be at least 250 feet apart. Stocks and cargoes should allow a 2 foot margin from walls and ceilings. Fire doors should be carefully protected and inspected weekly.

For protective purposes there should be open and automatic sprinklers, an independent standpipe system, roof hydrants with standard hose houses, a standpipe heating system in a separate room or building, Siamese fire department connections from both shore and water ends, monitor nozzles when required, casks of water and pails at 100-foot intervals, or at 200-foot intervals if alternated with 5-gallon pump tanks, an alarm system, a watch service, and a private fire brigade of pier employes. Chemical extinguishers and engines may also be installed, preferably of the non-freezing type. Oil or lamp rooms on piers should have steam or carbondioxide extinguishers with thermostatic control.

COMMITTEE ON MARINE FIRE HAZARDS

This report comprised three general sections, Construction, Appliances and Operation.

The Construction section covered recommendations on boiler protection; smokestack safeguards; steampipe protection; coal bunker ventilation and temperature-testing; oil storage and feed compartments, their testing, rust-proofing, ventilation, deck terminals, manholes and hatches, drainage provision, double bottoms, insulation from boilers and connections, and cofferdam location and ventilation; oil burning and heating systems; oil piping systems and their attachments; oil and electric lighting; galley ranges, stoves, smoke pipes, and steam heating systems.

Under the Appliances heading the subjects covered included small gear for fire fighting; hose, coupling and fittings; sprinkler installation, location and control; steam jets and inert gas for hold fires; fireroom apparatus; extinguisher selection guides; and alarm system and smoke-conducting detection pipes.

The Operation recommendations deal with crew organization for fire fighting, the cleaning out of coal bunkers at frequent intervals, safe practices in handling paint, fuel oil testing, bunkering, removal and discharge near vessel and docks, and compartment inspections and tests; and furnace safeguards against oil.

For safe practice in regard to hazardous cargoes, packing and stowage, the committee recommended adopting in full the rules of the Interstate Commerce Commission for Transportation on Railways of the United States, and of the United States Steamboat Inspection Service for marine transportation, pending regulation of the latter by the Interstate Commerce Commission as authorized by Congress in March of the current year.

COMMITTEE ON SIGNALING SYSTEMS

The committee recommended for tentative adoption a complete revision of the Regulations for the Installation, Maintenance and Use of Municipal Fire Alarm Systems, 1915 edition. The classification has been changed, and there were rearrangements and additions throughout, so that the committee did not want final adoption before the 1922 meeting.

The new classification divided fire alarm systems as follows: (1) manually operated; (2) automatic repeating; (3) automatic non-repeating. General installation, maintenance and test rules were given, together with wiring for all systems, and detailed specifications for each class of system.

COMMITTEE ON BUILDING CONSTRUCTION

This report consisted in Specifications for the Construction of an Office Building, Grade E, which is a typical joisted brick building; the committee drew the specifications to render this non-fireproof construction as slow-burning as possible, in response to an increasing demand for such information.

An important item in the specifications presented was that height not to exceed 55 feet nor be more than 4 stories.

The area may vary from 5,000 square feet to 12,500 square feet, according to the number of streets on which the building fronts, and whether or not it is equipped with sprinklers.

Items regulated included exits, foundation walls, bearing walls, exterior walls, non-bearing exterior walls, party and fire walls, openings in walls, loads on walls, piers, columns, floor and roof structures and coverings, stairway enclosure, construction and lighting, other shafts, protection of exterior and inter-

ior wall openings, service equipment, and roof tanks.

COMMITTEE ON SMALL HOSE COUPLINGS

The only change recommended by the committee in the Proposed Standard for Threads for Hose Couplings, ½-inch to 2-inch, was the reduction of the outside diameter of the male thread of the ½- and ¾-inch couplings from 1.0810 to 1.0625.

The Standard was adopted tentatively at the annual meeting last year, and was recommended with this change for final adoption this year.

COMMITTEE ON GASES

The committee recommended the tentative adoption of Regulations for the Installation and Operation of Acetylene Compressing Plants, which had been further revised by the Conference Committee after their tentative adoption last year. Another year for the consideration of further comment and correspondence was asked by the committee. As revised to date they covered layout and location, construction, operation and machinery in detail.

The Regulations for the Installation and Use of Internal Combustion Engines and Coal Gas Producers (edition of 1915), revised after conference with the American Gas Association, were ready for action by the Executive Committee. They included a classification of engines, stipulations as to the location of stationary engines, capacity and location of fuel supply tanks, auxiliary tanks for kerosene or fuel oil, fuel feed cup, carburetor or mixing valve, fuel feed pump, fuel piping and fittings, igniters, starters, exhaust piping, muffler or exhaust pot, lubricating oil drips and pans, closed engine base, gas control, and instructions to be posted for operation and maintenance.

Changes in the 1915 edition of the Regulations for the Installation and Use of Coal Gas Producers (Pressure and Suction Systems) were also recommended.

A Code for the Regulation of Refrigerating Machines and Refrigerants, adopted tentatively last year, has been under consideration and revision in joint committee meetings with representatives of the American Society of Refrigerating Engineers. These joint meetings had not been concluded at the time the committee's report went to press. In case the final status of the Code should not be complete concurrence with the A. S. R. E., or if the last meetings were not reported in time for action at the San Francisco meeting, the committee requested another year for its consideration. The final joint action of these two bodies will be submitted to the American Engineering Standards Committee.*

COMMITTEE ON INFLAMMABLE LIQUIDS

This committee submitted proposed Regulations for (1) the Storage and Use of Fuel Oil and for the Construction and Installation of Oil-Burning Equipments for Domestic Use, which it regarded as suitable for adoption, and (2) the Design and Construction of Concrete Fuel Oil Storage Tanks, which it suggested as tentative, pending the action of the American Concrete Institute at its next annual meeting, February, 1922.

The Regulations submitted as final on storage and equipments for domestic use provided for the capacity and location of storage tanks, their material and construction, the use of gravity and pressure tanks, the filling of auxiliary tanks, the oil pump to be used, the piping, valves, burners, pilot light in automatic systems, furnaces and ranges burning oil, space around furnaces, and instructions required to be posted.

The Regulations tentatively proposed for concrete tanks were the result of a conference between sub-committees respectively representing this committee and the Concrete Institute, but through misunderstanding the specifications reported by the two sub-committees to their main committees differed in certain respects. As reported to the N. F. P. A.

*The tentative code for the regulation of refrigerating machines and refrigerants which has been under joint consideration throughout the past year by the American Society of Refrigerating Engineers and the Committee on Gases of the National Fire Protection Association has been sent to members of the former organization for criticism and suggestions for improvement, under the title of "Mechanical Refrigeration Code."

they included general specifications, design and construction. Design must give attention to both internal and external loads, temperature reinforcement, and unit stresses.

COMMITTEE ON HAZARDOUS CHEMICALS AND EXPLOSIVES

Tentative Regulations for the Storage and Sale of Pyroxylin Plastic in Other Than Plants Manufacturing Such Material were submitted; these regulations had been drawn up after conference with the Pyroxlyin Plastic Manufacturers' Association, and covered sales and handling, storage of loose or packed articles not in shipping containers, storage of finished articles in shipping containers, storage of raw stock in shipping containers, and general rules.

The report of the committee contained several sketches showing arrangement suitable for raw stock storage vault and racks, tote box storage rack, sprinklers and baffles, and finished stock shelving.

The Regulations for the Storage, Handling and Use of Pyroxylin Plastic in Factories Making Articles Therefrom, adopted tentatively in 1920, were recommended for amendment.

Slight amendments were also offered to the existing Regulations Governing Storage and Handling of Nitro-Cellulose Motion Picture Films.

Acetylene Generator Precautions

ACETYLENE generators require careful watching for safety, even when installed with all the fittings approved by the Underwriters' Laboratories. A recent explosion reported to the California Industrial Accident Commission occurred in a generator which had been idle for about twenty hours after it was cleaned. The attendant claims to have run 300 gallons of water into the generator after cleaning. The next morning at about 8.15, he charged the carbide reservoir with 225 pounds of carbide, but did not start the generator. All valves were supposed to have been closed at that time. At 10 a. m. the same day the generator exploded, the failure being at the bottom head, which was torn completely free from the shell. The building containing the generator was completely wrecked and the attendant, who was in the building at the time, was thrown some little distance. He received first degree burns on his face, neck, right hand and right ankle.

After the explosion the presence of deposit in the blow off or sludge line from the generator to and through the valve in the line, and on to the open end of the pipe, indicated that the fire had traveled through this line and that the valve in the blow off or sludge line was open, or at least was leaking.

If the attendant's contention that he had put 300 gallons of water into the generator was true, the water must have escaped through the sludge line during the night. After the explosion, the walls and floor of the building were dry, but if there had been water in the generator at the time of its failure, the floor and walls of the building would have been spattered with carbide sludge.

When the carbide reservoir was charged a certain amount of carbide filtered through the feed, which may not have been closed properly, and lodged on the wet sludge on the bottom head of the generator. It is impossible to remove all of the sludge when washing out the generator.

As soon as the carbide came in contact with the wet sludge, it began to generate acetylene gas. Since there was no water, just the damp sludge, this carbide generated a very high temperature. In fact, the heat became so intense that it ignited the gas. Since the sludge valve was open or partially so, air had been admitted to the water reservoir and in combination with the freshly generated gas formed a highly explosive mixture. Had the attendant examined the generator and ascertained the amount of water in it before charging the carbide reservoir, it is reasonable to suppose that he would have been able to prevent the explosion.

Electrical Hazards and Their Safeguards

New York Central Railroad Entering New York City

By H. S. Balliet,

Assistant Terminal Manager, Grand Central Station

*Proceedings of the American Society of Safety Engineers**

IT is well to talk and think hazard: if you persist in safety thinking, you will have produced a safe condition and, therefore, the greatest safeguard conceivable. Very recently, due to absence of this line of thought, a relative of the speaker was electrocuted by contact established through a steel umbrella handle with a rope wash line. The rope was stretched across a lawn; a heavy rain was falling at the time. A broken telephone wire, due to a cross, charged the rope with a 220 volt a. c. lighting circuit. This circumstance caused two deaths, for the rescuer was also oblivious of safety, although aware of the crossed line.

It is quite common belief that hazard is present only on circuits carrying 600 or more volts. I have always advocated that we use discretion in our campaign, and start at 220 volts. The crossing or grounding of circuits will, as a general rule, result in injury or fire, unless guarded by a safety control, such as an overload circuit breaker. All circuits are provided with fuses or their equivalent. It is true, however, that these guards do not always function. Keeping in mind that electricity acts quickly when it is diverted from its intended course, there is need of much vigilance to forestall diverting it from its course. The "safety first" slogan is one of the greatest of safeguards.

High tension transformers are points where much care must be taken and frequently special engineering is involved in an effort to eliminate or anticipate the hazard. On most roads, screens or barriers are successfully utilized, except in special cases where extremely large units are employed; in such cases permanent fences are usually provided. It is common usage to prominently identify by sign or stenciling all high tension poles to warn against anyone climbing same and contacting with the acknowledged dangerous overhead circuit. A study of the varying designs of poles and voltages of the circuits placed thereon will develop many types of devices to safeguard the employe or the trespasser. Fences, screens, trap doors, bars, platforms, etc., are constantly in evidence.

You may be interested in some details from a signaling standpoint: Take the case of underground high tension circuits —I have in mind an installation of a 3,300-volt line where the precaution taken is to provide, as far as possible, for the thorough grounding of all parts ordinarily dead but which may possibly become charged on account of some defect in the apparatus, or because of some accident. All apparatus in connection with the line is located in iron cases on concrete foundations, and a one-inch pipe fastened to a large iron plate at the bottom is built into the foundation and extends about six inches above the foundation top, and into the iron case. The transformers and switches are bolted solidly to the case, which in turn is connected to the iron pipe by a heavy copper wire. In addition, the case is, of course, pretty well grounded by the hold-down bolts and concrete. On the Grand Central Terminal and Electric Division of the New York Central Railroad the 2,200-volt single phase signal line is carried in underground ducts and on steel poles. When in ducts, there is provided a separate chamber underground, or iron terminal box on the surface, to anticipate the hazard, by thus separating them from the 11,000-volt circuits; also to avoid the likelihood of blowing out the signal circuits should there be high tension trouble in the other chamber, or vice versa.

*This paper as read contained considerable matter of a strictly railroading nature, and the Publications Committee, A. S. S. E., has abstracted the paper so as to present the essential safety matter within the space available.

When placed on an iron pole line the protection provided for the 11,000-volt open line circuits serves the double purpose for both classes.

The general practice for the various types of high tension lines is to ground all poles and bridges. On some roads the grounds are made by the use of heavy copper plates embedded in coke and buried below and outside of the concrete foundations. On other roads, poles and bridges are grounded directly to the running rails which carry the return propulsion current. It is the effort of all properties to have specially trained men who maintain and operate all high tension circuits.

Returning to the matter of signaling: The employe, although highly skilled in all matters relating to this subject, is safeguarded by the use of screens, etc., at all transformers on ends of bridges and other points of danger, to anticipate hazard in the vicinity of all high tension circuits.

The maintenance and operation of the various types of electric equipment is safeguarded by mechanical devices of varying design so that we are able to produce wonderful results from a guarding standpoint.

You may be interested in noting the developments from a hazard and safety standpoint in the Grand Central Terminal. Many unique and very special applications were required during the construction period and are still in evidence.

An interlocking plant controlling switches and signals by the means of low-pressure air was located on an abandoned bridge pier.

Switch tenders, together with the stands, were placed on an elevated structure known as a "bird-house."

The signaling details required much care and ingenuity in housing apparatus. The selection of locations for buildings became an intensive study: Their location, although difficult from a physical standpoint, has proved the wisdom of the choice and has also proved the safety first rule.

It is advantageous and quite a safety factor to a railroad to avoid at all times operation in such congested areas as under discussion.

Experience has shown that the low-voltage third rail, suitably protected, is not dangerous. Let us briefly examine the installation of this system on this line and compare it with its use on several railways. You appreciate the need of protection against the public infringing on the hazard of getting on tracks and within the "Danger Zone" of electricity. Observe the wisdom of the permanent fences on the right-of-way, the fences between tracks at stations, and the use of pipe ducts on side walls of the Harlem Depression, and on the Park Avenue Viaduct.

There are two very important drawbridges spanning the Harlem Ship Canal. The one at 138th street and Park avenue is herewith presented as one of the most difficult examples of securing and sustaining the safety factor against electric hazard.

The 3-phase, 11,000-volt, 25-cycle, a. c. current transmission circuits are carried on steel poles, or placed in conduits over or under ground. Each high tension steel pole is grounded to an individual ground plate. In addition to this an overhead ground wire is used for tying in all poles.

From a signaling standpoint, the guards against contacting are briefly stated and illustrated as follows:

When a primary fuse is blown on a 2,200-volt signal transformer it will be replaced by a qualified transmission man when he is present. If a transmission man is not present, the fuse will be replaced by a signal maintainer who has been instructed how to make such a replacement.

Transformers located on high tension poles or signal bridges are protected by the use of fuses in plug cut-outs located on top cross piece supporting transformer.

Where 2,200-volt signal line is installed in pipe or underground ducts, transformers are protected by the use of cartridge enclosed fuses located in high tension fuse boxes.

No signal department employe shall go above or do any work above bottom cross arm on high tension poles and must keep clear of all wires and connections.

No employe shall work around 2,200-

volt signal line apparatus without rubber gloves.

When replacing or removing 2,200-volt cartridge fuses, the employe must wear rubber gloves in addition to using wooden tongs for handling the fuse.

Signal transformers of 2,200-voltage can be considered dead. Where secondary fuses have not been installed, bus line connection must be disconnected.

Transmission Department employes maintain and make all connections to primary side of high tension transformers. Signal Department employes maintain and make all connections on the secondary side.

Transmission Department employes make and maintain ground connection between high tension transformer cases and ground.

Before doing any work on high tension transformer, it must be known that ground connection to transformer case is intact.

All signal department high tension transformers are assembled with a thin copper plate between primary and secondary windings. These plates are bonded together and connected to core and case. This method protects and shields the secondary winding from the primary, and is provided as a safety factor because conditions and physical characteristics of the signal circuits prohibit grounding the neutral top of secondary for protection.

The whole underground development of the Grand Central and other similar terminal facilities was made possible by the electric locomotive, of which many variations are now in use. This wonderful machine has removed the former constant handicap of smoke and steam which obscured the vision of employe and trespasser alike.

You will want to take with you an impression of what organization has done in this development, and its perpetuity. The loyalty and service rendered is one of the greatest in the world. Teamwork is the theme. Co-operation between all units is what keeps this great machine functioning.

"Safety First" is the watchword.

Methods of Classroom Ventilation

J. R. McCOLL'S paper, "A Plea for Better Air Distribution in Ventilating Systems," presented before the semi-annual meeting of the American Society of Heating and Ventilating Engineers, June 16, 1921, was an argument that ventilating engineers abandon the old ventilation standard of 30 cu. ft. of air per person per minute, in favor of an adjustable standard depending on the method of distribution. Detroit schools were the examples cited of an improved form of air projection system by which it is hoped to cut the standard quantity of air used to 20 cu. ft., although the system is designed to provide 30 cu. ft.

RE-CIRCULATION AND INTERMITTENT SUPPLY

Mr. McColl believes that ventilating engineers will eventually come to the re-circulation of a large portion of the air in schools, and that something will be done on intermittent ventilation. "Instead of maintaining continuous and uniform distribution, whatever the type, systems will be designed to give intermittent flow of air, making the maximum delivery velocities much higher than are now in vogue for continuous operation and tapering off to practically nothing before the next impulse. Dr. E. V. Hill, of Chicago, and Mr. W. F. Walker, of Detroit, as well as others have been giving this matter considerable study.

NEW DETROIT SYSTEMS

The new Detroit systems are arranged so that it will be very easy to add this feature if the time ever comes for its application. The necessary intervals, of course, will be a matter of experiment and probably individual opinion."

EDITORIAL

SHOOTING TO HIT

IT is an easy generalization to accuse Carelessness of responsibility for the excessive waste of property and lives by fire. In the absence of real "plans and specifications," Carelessness is often denounced as the cause of many faults, national and individual. To accuse Carelessness and stop there, satisfies nine-tenths of the speakers and writers on various economic questions; the sermonizers like the sonorous sound of it. But real students and efficient reformers get down to brass tacks.

The members of the National Fire Protection Association are convinced that a lot of things besides crying "Carelessness," should be done to protect American lives and property against menace from fire. Their program is a practical one, calling for specific work and particular medicines.

The Association wants standard building laws; official investigation of all causes of fires; relentless prosecution of incendiary policyholders and other firebugs; systematic inspections of buildings by city fire marshals or local firemen; ordinances fixing the cost of extinguishing preventable fires upon citizens who disregard fire prevention orders; prohibition of pyrotechnic displays; the use of slow-burning motion picture films; the universal use of the safety match; prohibition of smoking in factories and mercantile buildings except in fireproof rooms; the education of children regarding fire dangers and a number of other activities by States, cities and individuals, recorded in the resolutions adopted on June 14 at San Francisco.

The N. F. P. A. fire fighters call for a more general fire-restrictive building construction, for non-flammable roof coverings, for more fire walls, for more automatic sprinklers, for better protected openings in fire division walls, for safe and unobstructive exits, for a wider installation of private fire alarm devices, for more private fire fighting apparatus, and for other practical protective measures.

The N. F. P. A. demands, not all of which are enumerated here, call upon the legislatures to use their powers, the police to employ vigilance, the schools to lend their influence and, especially, upon engineers to use their skill to reduce the costly annual ash heap of the Nation.

Fighting fire with science promises much better and more permanent results than fighting it with yap and repetitious lamentations.

HIGH AND LOW WATER ALARMS

To the Editor of SAFETY ENGINEERING:

SIR: I have noticed in the article by Warren Hilleary, published in your April number, entitled "Safety Features of Steam Boiler Accessories," that the author belittles the advantages of high and low water alarms for fear that the attendant will become too dependent upon their operation. It would seem to me as though the same argument might apply to the protection of a railroad crossing or any other danger signal. Surely it is not claimed that the presence of a flagman at a railroad crossing is a danger, because the automobilist would be disposed to put too much trust in his being there.

The high and low water alarms, to my mind, serve to keep the attendant on the

job, because if negligent his negligence is announced by the alarms and his superior has his attention called to the negligence.

In other words, the mere fact of the alarm sounding is public evidence of the fact that the boiler attendant is careless. If the alarms are not used a dangerous water level might be reached frequently and discovered in the nick of time by the attendant without any one else becoming the wiser. Personally, I would much prefer to have this additional safeguard.

BOILER CHIEF.

Newark, N. J.

TO RECRUIT THE ARMY OF FIRE PREVENTIONISTS

To the Editor of SAFETY ENGINEERING:

SIR: Mr. Samuel Untermyer may be muddled regarding some of the things he has said about the practices of fire insurance companies, but I think he was not far wrong when he remarked that it "looked as if the insurance companies were discouraging rather than encouraging new forms of fire prevention in order to keep premium rates at a substantial level."

I am not a fire insurance underwriter so, perhaps, I may be in error in thinking that the fire insurance companies are too uniformly desirous of obtaining a big volume of premiums.

Passing by the reference to "new forms of fire protection"—of which I know little—there is enough to be said concerning established and well known forms of fire protection—the researches of the Underwriters Laboratories, the work of the National Fire Protection Association and of the rather large number of engineering bodies co-operating with those associations.

It is fair to ask, "Do the fire insurance companies encourage their agents to check fire waste *in the one effective way, the rate of commission?*"

In my opinion nobody will find difficulty in discovering that agents, brokers and business-getters in general now receive a fixed commission rate on any and every premium collected. In other words, the whole commercial end of fire insurance is interested *in the size of the premium and not in the quality of the risk.*

If a system of remuneration to agents and brokers could be devised, based on the face value of the policy, taking, say, $100 or $1,000 as a unit of insurance, and the commission rate, per cent of insurance, were lessened as the premium rate increased, there would be a complete reversal of the present practice. If the agent would receive his largest commission-rate on the lowest premium-rate (the safest risk), he would fight for fire prevention and for the reduction of fire losses to the last ditch.

There are tens of thousands of fire insurance agents in the country who are not now fire preventionists. But they would become fire preventionists if they received a higher rate of pay for writing the safest risks. Now, the agent receives the same rate of commission on bad risks as on good risks—a practice that seems to me to be wrong, scientifically and psychologically.

The housing problem of our country demands such action and if, through the Lockwood investigation, the State of New York should lead the way, the whole Nation would soon get in line.

Another suggestion: Let the fire insurance companies make the premium rates, but let the State name the rates of commissions to agents—the biggest commission on the safest risks.

FIRE STOP.

New York, June 10.

Engineering Aspects of Signaling

By A. H. Rudd

Chief Signal Engineer, Pennsylvania Railroad System

Proceedings of joint meeting of the Engineering Section, National Safety Council and the Philadelphia Section, A. S. M. E.

RAILROAD signaling is based on the proposition that any failure should be on the safe side. All apparatus, is, therefore, designed so that, as far as possible, any failure will cause the signal to display its most restrictive indication. This means that semaphore arms are counterweighted to go to the stop or caution position should the power fail or apparatus be deranged; that signal circuits are all designed on the closed-circuit principle; that power must be properly applied to give a "Proceed" or "Clear" indication.

Recognizing that even then we may have what we call false-"Clear" failures, or that lights may be extinguished, we have a rule which it would be difficult to enforce in industrial plants, that the absence of a signal where one is usually displayed, or an imperfectly displayed signal, must be regarded as the most restrictive indication which that signal can display, and the failure reported to the Superintendent.

LIGHT SIGNALS VERSUS POSITION-LIGHT SIGNALS

The signals in general use are semaphore arms for day and colored lights for night. On some parts of some roads, colored lights are used both day and night and, within the past five years, the Pennsylvania has used rows of slightly yellowish lights to simulate the positions of the arms, knowns as position-light signals.

The advantage of light signals is that they have no moving parts; that of position-light signals, that there is no chance of a color-blind man's mistaking them. On account of their simplicity and lack of moving parts, light signals are becoming more and more popular. Of course, the lights may fail.

It will probably be hard in industrial plants to establish a rule that lights shall be displayed when it is safe to proceed and that no lights shall indicate a dangerous condition. This, however, is a correct principle. As shop employes are rarely examined for color-blindness, it would appear that indications given by position might be better than colored lights.

RELIABILITY OF SIGNAL ESSENTIAL

If the signal is depended upon to indicate danger, it must be absolutely reliable, as otherwise, since employes grow to depend upon these signals as a warning, in the event of a signal's failure they are encouraged to take chances. So that signals, if installed at all, should be arranged so that failure of power or breakage of power transmission line will still result in the display of some signal.

One of the most desirable features in protection of any kind is uniformity, so that employes will know what to expect when a certain signal is displayed. This is particularly true in the protection of highway grade crossings where the interest of the public and the railroads in the protection is identical, and uniformity all over the country at such crossings is most desirable. The American Railway Association has made a number of recommendations which have, in a large measure, been carried out throughout the country: (1) Striping in black and white of crossing gates; (2) Placing of "Stop" signs of uniform appearance in the hands of the watchmen; (3) Display of red lights on crossing gates or in the hands of the watchmen toward team traffic at night; and (4) Placing of white disc with black cross and the letters RR at the side of the highway 300 ft. to 500 ft. from the railroad crossing, indicating to vehicle drivers that they are approaching a railroad; this is required by law or by order of the Public Service Commission in some of the States.

It is my personal opinion that drivers owe something to themselves in the way

of protection, and that a sign indicating they are approaching a railroad should cause them to exercise proper care, just as a sign indicating a sharp curve or heavy grade on the public highway requires similar action.

There are many automatic devices in the market for the protection of such crossings, usually located at the crossing and operated by the approach of the train; among these are bells, wig-wags, flashing lights, etc., all of which have moving parts.

The simpler a device of this kind is, the more reliable it is, and the less chance of failure. The absence of such a device where one is usually displayed might lead drivers to feel that no train was approaching.

DAY AND NIGHT LIGHT SIGNAL

We have designed a signal for use on the Pennsylvania System, in States where its use is approved by the Public Service Commission, consisting of two vertical red lights, visible day and night, operated by the train, the operating track circuit being on the closed-circuit principle, so arranged that, if one of the lights burns out, the other will still be displayed; as this signal has no moving parts except the track relay armature which is common to all automatic devices, motors, flashes, etc., are eliminated.

In view of the possible failure of all automatic devices, their use is not recommended at the ordinary open crossing, it being felt that the sign 500 ft. away, warning drivers that they are approaching a railroad, is sufficient, where there is a good view of the track in both directions; but where the view is shut off by buildings, etc., and an automatic device is to be used, it is recommended that the one described above be installed, so that, in a short time, the public will be educated to the fact that certain signs indicate approach to a railroad, and other devices indicate that a train is coming, the absence of such devices not indicating that it is safe to cross, but their presence being an additional warning that there is danger ahead.

If some such uniform protection could be attained, it is fair to suppose that a good many of the highway crossing accidents might be avoided, even though there are some drivers who are so reckless that, regardless of what is displayed, they will take chances.

In my opinion, devices of this kind should be installed where necessary at existing crossings, not as an absolute remedy, but as the best that can be provided short of separating the grade, which separation, under the present financial condition, is absolutely impossible for some years to come, though it will eventually be made.

Comparative Lighting Values

DAYLIGHT in an industrial plant measured by a photometer had an intensity of 90 foot-candles at the benches next to windows with southern exposures, 70 foot-candles at the benches next to northern exposure windows, and intensities of 50, 40 and 20 at inside benches between the two exposures, in an investigation conducted by the Lighting Service Department of the Edison Lamp Works and described by J. H. Kurlander, in *General Science Quarterly*, May, 1921.

Other measurements taken in the same way showed interesting contrasts. Sunlight in an open field measured 8,000 foot-candles; in a street between buildings, 3,000. Shadow in a street between buildings measured 300; under a tree in the open, 500. The light on an office desk next to a south window had an intensity of 110 foot-candles; one 10 ft. in, 70, and one 18 ft. in, 50.

Mr. Kurlander's conclusions are that "there is practically no such thing as *over* lighting, and investigations of places which are said to be overlighted will usually show that if anything they are *glaringly underlighted.*"

Engineering Revision—the Engineer's Part in Safety

By C. P. Tolman

Chief Engineer and Chairman, Manufacturing Committee, National Lead Company, and President, National Safety Council

Proceedings of a Joint Meeting of the Cleveland Engineering Society and the Engineering Section of the National Safety Council

IN the application of engineering principles to safety the engineer is answering the same call of humanity to which engineers of all time have responded.

What is the magniture of the problems with which we have to deal?

I have before me some statistics prepared by Sidney J. Williams, secretary of the National Safety Council. We can read our answer in the following annual statement, rendered and paid in full by the industries of our country in 1919:

Human lives	23,000
Accidents, each causing four weeks disability or more	575,000
Accidents involving one day disability	3,000,000
Total equivalent working days lost	296,000,000
At average of $4 a day	$1,184,000,000
Incidental expense—medical, surgical, hospital, insurance, etc.	161,000,000
TOTAL	$1,345,000,000
Credit for the subsistence of 23,000 men who no longer need, clothes, food nor housing	$331,000,000
BALANCE DUE	$1,014,000,000

Received Payment in Full.

Perhaps it was an unusual year? Yes. In the previous year *more* men were employed and the bill was 13 per cent larger.

We may safely agree that this waste of $1,000,000,000 a year is great enough to demand attention. Our next question is "Can this waste be substantially reduced without prohibitive expense?" The answer is "Yes; it has been done."

SAFETY METHODS REDUCE ACCIDENTS 70 PER CENT

I have totals here from the data of 8 widely known companies, in each case comparing the accident record of one year with that of a previous year. The total number of men employed by these companies is 36,200. The reduction in accidents measured by the difference in days lost per thousand hours worked averages over 70 per cent.

We have part of our answer—it can be done. Now: Is the cost prohibitive?

On the contrary, *properly conducted accident prevention work pays a larger return on investment and operating cost than any other department of the ordinary industrial plant.*

A company operating a coal mine with 100 men reduced its accident cost per ton 68 per cent. A large corporation's safety work made a profit of $1,000,000 a year.

SAFETY TASKS FOR THE ENGINEER

We are here considering the relation of the engineer as such to the material rather than the human side of industrial safety.

Usually the engineer finds for his problem a plant equipped and operating. He is required to make it as safe as possible, but he must not interrupt operations, decrease output or increase cost, or make changes of a character or in a manner to cause labor trouble, or which will affect the character of the product.

Hundreds of engineers are doing effective safety work under just such restrictions, limited of course to the more common measures, such as guarding machines and transmissions, betterment of ventilation, lighting, floor conditions, etc.

To answer all requirements satisfactorily a gear guard calls for skillful design. Among other requirements, it must be securely attached, readily opened or removed, more easily left closed than open, and designed for economical manufacture; it must not interfere with oiling or adjustment of the machine, or drip oil

or grease on the floor to make a slipping hazard; the means for attaching and opening should be of a kind familiar or obvious to the average workman; and so far as possible, inspection of gears should be possible without opening or removing.

INCREASING PRODUCTION BY SAFETY METHODS

Leaving the more obvious measures incidental to safeguarding machinery, let us consider measures for safeguarding the immediate work of the operator, a much more profitable field for the engineer. Most of the profit in the earlier class comes through saving the cost of accidents, whereas in the latter class, by bettering operation from the safety standpoint, we not only reduce accident cost, but if our work is properly done we invariably increase production or save waste.

In the white lead industry portable dust collectors were developed and used for sanitary reasons. Out of curiosity the lead dust saved was weighed. The average saving of lead amounted to a return of over 30 per cent on the investment.

Semi-automatic press feeds will, while making the operation safe, increase output from 10 to 100 per cent. Full automatic feeds will better this. Ejectors or kick-outs give similar results.

In another class of machinery infamous for mutilation of hands, it is estimated that 70 per cent of saw accidents originate in bad condition of the saw—dull, not properly set, or not properly gummed. By keeping the saws in reasonable order, the average woodworking plant would eliminate the source of 70 per cent of saw accidents and make a net gain of 20 per cent in production.

SELECTIVE ACCIDENTS

In the machine shop we have the usual groups of accidents, the kind which may befall any workman, and also accidents which select either (1) the careless, indifferent or ignorant workman, or (2) the best of the mechanics.

The best known example of the last type of accident happens when your machinist uses his hand as a brake on the rim of the face plate of his lathe. The man who does this is the man who wants to see his work progress. He is not content to stand idle while his lathe comes slowly to rest. He wants to get the piece out when finished, and get in the next one. So he disobeys orders—he does just what you or I would do—he is interested in his job and he takes the chance.

This hazard can be wiped out. The corrective measure involves an important fundamental principle in safety work: *Make it easiest and most effective to do it the safe way.*

In this case the thing to be done is to stop the lathe. The power must first be shut off. The remedy is obvious. Equip the lathe with a brake; if it is a belt driven lathe, use a foot pedal which when pressed first shuts off the power and then applies the brake. The almost instantaneous effect of the powerful foot brake leaves no incentive to use the hand on the face plate. If the lathe is direct motor driven, use a controller designed for dynamic braking.

ENGINEERING REVISION BASED ON UNIT VIEWPOINT

This is the general principle of engineering revision as applied to safety—*regard the whole plant as one machine.*

Provision for clear aisles is a safety measure.

Correct and adequate lighting equipment and correct location of machines with regard to mutual light prevent eye-strain; waste from faulty manufacture is thereby saved, and produtión increased.

Grouping equipment involving special hazards or bad working conditions makes it possible to treat these conditions effectively, and avoid exposure of other employes than those engaged in the particular work. For example, furnaces so grouped can be hooded to carry off heat and fumes; special cool air supply can be provided. The advantages of grouping apply also when chemicals are used or dusty operations are involved.

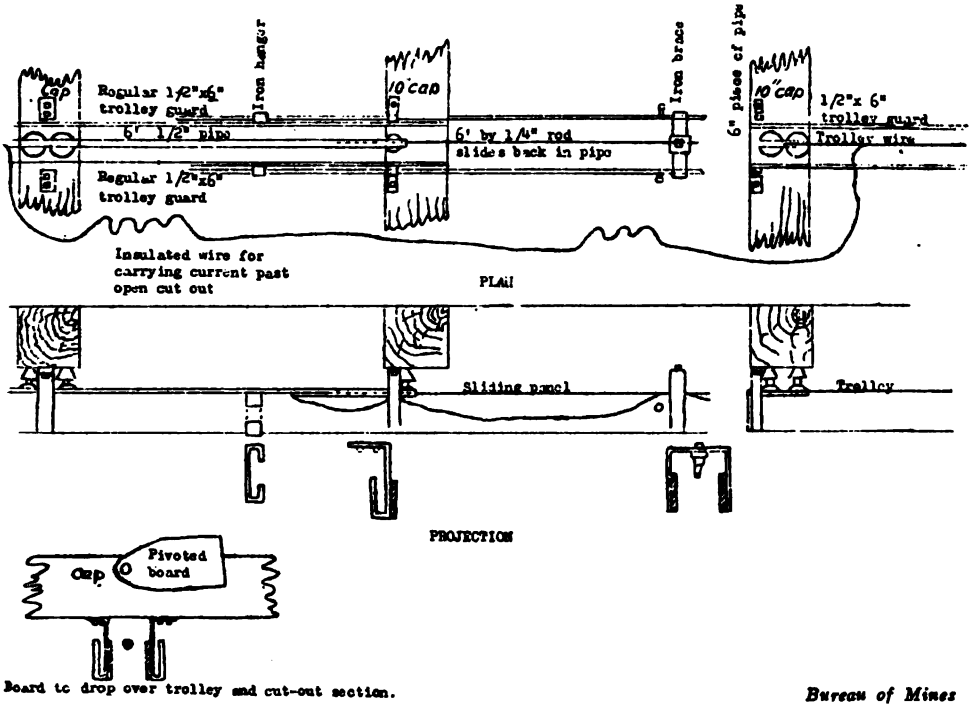
The engineer must be safety-minded. He is not true to the ethics of his profession or to the interest of his client if, knowing the effectiveness of the safety viewpoint, he fails to make safety a part of his professional attitude towards all his work.

Trolley Wire Cut-Out for Mine Safety

TO overcome the danger at loading-chutes from trolley wires used in electric haulage in mines, a new cut-out device has been installed at about 90 points in the Lowell, Arizona, mines of the Calumet & Arizona Mining Company. A cut of this device is shown below.

bered with drift sets placed 5 feet apart, and the loading chutes take up the space between two sets. All trolley wires are carried 6½ feet above the rails and guarded by two ½- x 6-inch boards placed on either side of the wire.

The cut-out is simple in construction, and consists essentially of a section of



Bureau of Mines

Sketch Showing Trolley Safety Cut-Out for Loading from Ore Chutes

This safety cut-out was designed by W. R. Gibson, chief electrician of the company, to replace a less convenient safeguard, and is efficient, easily constructed and does not interfere with operations at the chutes or with the motors operating on the same level.

When the cut-out is open the electric current is carried past the gap by an insulated wire on the opposite side of the drift. A hinged board drops down over the ends of the trolley guard when the slide is open and prevents anything touching the live wires.

The levels under the stopes are tim-

¼-inch rod that slides back into a 6-foot length of ½-inch pipe, both of which are a part of the trolley line. When closed one end of the rod remains in the long pipe, at the set-back of the chute, and the other end fits into a 6-inch length on the set-ahead; both ends have enough bearing to make proper electrical contact. Standard electric equipment is used in the mine and as the trolley-wire hangers will not fit the ½-inch pipe, a ¼-inch rod is welded on top for clamping it in place. The motors run past the cut-outs with no interference.

When the cut-out is closed, it is

guarded by two ½- x 6-inch boards, as elsewhere. The free end of the rod and guard boards are fastened together by an open rectangular piece of ½- x 3-inch iron. The trolley rod is hung from the top of the iron by insulated hangers, and the guard boards are bolted to the sides. The boards slide back in brackets outside of the regular guards.

Occasionally, in wet places, enough current leaks through the insulators to the boards of the cut-out to shock a man: to prevent this insulated knobs are placed on both guard boards for handling.

●

State Fire Marshal Offers Advice to Prospective Builders

IN the renewed building activity which is beginning with the somewhat lower costs of building materials, and the hoped-for decrease in prices of construction labor, the office of a State Fire Marshal has sent out to prospective builders some timely advice, from which the following suggestions have been taken:

Do not build to burn. Use more fire-resisting materials, now that there is but little difference in cost between these and combustible materials. Above all, have a non-combustible roof covering, install furnaces and boilers on a brick or concrete base, and provide a good clearance above and on all sides; build a good brick chimney, with ample flue, lined throughout with terra cotta or fire-clay flue lining; see that no woodwork is in contact with the chimney; fire-stop all partitions, walls and floors; get the most competent man you can to install gas piping and fixtures and electric light and power systems and devices. In short, build so fires cannot start readily, cannot spread rapidly, and can be extinguished easily.

Large floor areas should be subdivided as much as possible by fire walls and fire doors, operating automatically. Vertical floor openings should be as few as possible, and such openings should be trapped or enclosed.

In large factories and public buildings the heating and power plant should be in a separate building.

Do not trust too much to your fire department for protection. There may be delay in the discovery of the fire, transmission of the alarm or the movement of the fire apparatus. Be prepared to fight fire yourself.

A few approved chemical fire extinguishers, water barrels and pails should be on hand to attack the fire in its incipiency, also standpipes and hose in the larger buildings.

Where large values are involved an automatic sprinkler system should be installed.

Dry Filters' Resistance to Air-Flow

TESTS of the resistance to the flow of air through different materials used as dry filters in connection with air-conditioning processes, made at the Newark laboratory of the Carrier Engineering Corporation, were the subject of a paper by A. E. Stacey, Jr., at the Cleveland meeting of the American Society of Heating and Ventilating Engineers, June 15, 1921.

The filter materials tested were wool and cotton felts, china silk, cotton flannel, metal screens, and composite filters of china silk and absorbent cotton, cotton flannel and absorbent cotton, and muslin and absorbent cotton.

The conclusions reached were:

1. That the resistance of air filters varies directly with the velocity of the air through the material.
2. That the resistance is not affected by variations in relative humidity.
3. That the resistance of cotton felt is approximately 100 per cent greater than wool felt of the same weight.

(Velocities up to 50 ft. per minute.)

Dust Explosions

AT a meeting of the Western Society of Engineers, March 28, 1921, Mr. David J. Price, Engineer in Charge of Grain Dust Explosion Investigations for the Bureau of Chemistry, United States Department of Agriculture, gave an informal talk on the nature and causes of the various dust explosions occurring with increasing frequency. This increase is due, Mr. Price feels, to the growing utilization of byproducts in the preparation of which very fine dust is produced. The control of such explosions is a problem to be handled by the industrial engineers of the country, on whom the bureau which Mr. Price represents must rely for application of the preventive and control methods which it has outlined and established. Many of the engineering problems encountered are not yet solved even theoretically.

Industries that have not been considered dangerous from the dust explosion hazard are rapidly reversing their standing in this respect. Rubber dust, oat-hull dust, smut dust in wheat, cotton, flour dust, and ordinary non-material dust have all been proved as explosive under certain conditions as coal dust, of which one-fiftieth of an ounce to a cubic foot of air space is sufficient to produce an explosive mixture. Agriculture and grain-elevators are among the industries in which attention to the dust-explosion hazard are needed.

A series of experiments at the Nela Park Laboratory of the National Lamp Works, Cleveland, Ohio, in which the Bureau of Chemistry secured co-operation also from the Westinghouse and Edison Lamp Companies, established very definitely that there is not a type of electric lamp made but that when the bulb is broken will produce dust explosions immediately if there is the proper proportion of dust in the air. This means that the use of electric bulbs in dusty atmospheres is unsafe. They must have vapor-proof coverings; a mere wire guard is not sufficient.

Dehydration Equipment as Safety Field

WITH prohibition in force the recent development of dehydration and evaporation processes will probably be given a strong impetus, for the wineries' equipment must be replaced, and the most feasible change appears to be the substitution of dehydrators. Wine grapes are already finding a market, dried. Under these circumstances the dehydration field is deserving of serious attention more than ever before. In an article in the April Quarterly of the National Fire Protection Association, Paul St. John says, "Construction of dehydration plants has not been standardized, and all the hazardous conditions usual to a new process may be found. In some cases dryers are of the best fire-resistive construction, while others, built entirely of wood and even having wooden hot air flues, are extremely hazardous from the standpoint of fire risk."

To secure the safe and proper construction of dehydrating plants, the following advice is given: "The dehydrator proper should be built of incombustible material—either brick, concrete or interlocking tile. The shed or structure built over the dehydrator may be of frame, but it should be open, substantially built, and properly insulated from the dehydrator.

"All air carriers from the furnace, if this system is used, should be of incombustible material. The heating apparatus should be also of such a material that it will easily transmit the heat to the surrounding air, and yet will permanently separate the open flame from the air used in the dehydrator. This rule is of pri-

mary importance. Where oil is the fuel, sumps in front of the furnaces should be avoided if gravity fuel feed is used.

"All electric wiring should be in conduit. Fans, when of the blower type, should be protected by a wire mesh screen that will prevent entrance of sparks into the air chamber.

"Precautions should be taken to have a simple and easily manipulated heat control device which shall be at all times under the observation of the employe whose duty it is to control the air drafts. This, of course, is as essential to the proper preparation of the product as it is for fire prevention."

Competition as a Factor in Accident Prevention

By G. E. Sanford

Safety Engineer, General Electric Company

THE American citizen is, almost without exception, interested to more or less extent in various kinds of games, athletic events, or other conditions wherein competition is an essential. This attitude of the *genus homo* has been taken into account in certain plants of the General Electric Company, where accident prevention on an inter-department competitive basis has been in force for some time.

The plant of the General Electric Company at West Everett, Mass., consists of large steel and iron foundries, with a pattern shop and a machine shop for local plant repairs. The several departments of that plant have been competing with each other for best record in number of days in which any department has gone without a lost time accident. The figures for that plant on June 1 are as follows:

Departments	Days
Steel Foundry, large work, day job	33
Steel Foundry, large work, night force	216
Steel Foundry, small work	182
Open Hearth Steel (including charging furnaces, etc.)	232
Iron Foundry	34
Chipping Department	90
Pattern Shop	256
Mechanical Department	279
Yard Gang	124

At the Lynn, Mass., Works it was found on the start of an inter-department competitive accident prevention contest that certain departments, where the hazard was particularly great, were running far behind departments where the accident hazard was minor, and therefore, apparently, workmen were beginning to lose interest in the game. One of these departments was the Punch Press and Die Department, which at the start of the Safety Competition in Accident Prevention, in August, 1920, had 1,000 employes. The same department had about June 1, 1921, 567 employes. The machine equipment is 563, of which 284 are punch presses. It was soon seen that employes of this department were not taking the interest it would appear they should, as the department fell rapidly behind others, so the department was divided into eight geograhical divisions and these divisions pitted against each other for a contest within their own building, for the time being disregarding what was going on in the other departments. This local contest worked out so nicely that it listed the department well up in the running with the less hazardous departments in the plant, and reduced the number of lost time accidents from an average of 10 per month at the start of the competition to a present rate of 2 per month. Compensation actually paid to injured employes in that department was reduced 78 per cent from August, 1920, to June 1, 1921.

Explosions in Air Compressors

AIR compressors generate heat that must be artificially eliminated even when the proper lubrication reduces friction to a minimum. Such lubrication is further necessary to seal the space around the piston and prevent leakage. The difficulties of providing safe and adequate lubrication were discussed by A. D. Risteen of the Travelers Insurance Company before the Engineering Section of the National Safety Council, at the Philadelphia meeting. Mr. Risteen's consideration of the subject included explosions due to causes external to the air end of the machine as well as the more important "accidents consisting in the explosion of something inside the compressor or its piping or other connections, or which are initiated by such internal explosions."

The theoretical internal explosion-causes are (1) oil-vapor, which Mr. Risteen claims could not produce a violent explosion, and (2) carbonized lubricating oil, which is deposited in compact form, and sometimes prevents the valves from closing properly. It is to safe practice in relation to this carbon deposit that Mr. Risteen devotes the weight of his attention. "Every effort should be made to prevent the accumulation of 'carbon' deposits anywhere about the compression apparatus, and such matter as may be deposited in spite of all reasonable precautions in the way of selecting the oil and feeding it to the cylinder should be cleaned away, frequently and regularly. A good deal can be accomplished in the way of cleaning the compression apparatus by discontinuing the oil from time to time and feeding soapy water into the cylinder for two or three hours,—say once a week. This often helps marvelously to clean out carbon deposits and deposits of gummy oil. The soap solution may be made up of one pound of soft soap to seven or eight quarts of water, and it is advisable to feed it into the cylinders at a rate something like ten times as great as the rate at which the oil is ordinarily supplied. The frequency with which this treatment should be given depends upon the experience that has been had with the particular air compressor under consideration. Some authorities recommend the introduction of a solution of lye into the pipe between the cylinder and the receiver, every month or two. The lye solution may be made up by using one pound of lye to eight or ten quarts of water, and it may be delivered into the air discharge pipe by means of a sight-feed lubricator at the rate of 60 to 70 drops per minute. After using the lye or the soap solution, the receiver should be blown off, and oil should again be used in the cylinder for a time, before stopping the compressor. Otherwise rusting is likely to occur." Hard carbon deposits should be cleaned out by mechanical means. No inflammable solvents should be introduced in cleaning.

The quantity of oil used in lubricating should be kept at a minimum for safety; while no rule can be established, the proportion for an air compressor varies from a quarter to a tenth of that needed for the cylinder of a steam engine.

A further safety measure recommended for air compressors is to watch the cooling jackets for sediment or scale deposit, and to eliminate any deposit, either by mechanical means in the jacket, or by filtering or settling the cooling water before using it.

What Does a Theater Audience Do in Case of Fire?

By Arnold Neuenschwander

Chief, City of Louisville Fire Department

EARLY this spring there was a fire-call from the box located on the stage of the Mary Anderson Theater here. It was in the evening, about half past ten, during a performance, and the customary thing in theater-fire conduct would have been for instantaneous panic to ensue from orchestra to gallery.

We responded with three engines, two truck companies and the water tower. When we arrived we found a considerable amount of smoke issuing from the third balcony windows, and some smoke issuing from ventilator registers in the ceiling above the second balcony. We found the fire in the air-shaft between the second and third balconies and extinguished it without much trouble with small chemicals.

Meanwhile, what of the audience? When we arrived the house was about half emptied, and we found the orchestra playing in full blast, the manager and actors on the stage jesting and laughing, and the audience filing out, talking, laughing, and under extraordinary control.

The only semblance of excitement I saw was on the stairway leading to the colored section of the third balcony, and the conversation ran along like this: One colored gentleman remarked to another as he saw the firemen: "Jim, dey mus be someting de mattah." Jim responded: "Niggah, dey's allus someting wen yuh sees dem fellahs comin'."

Another pair were moving all right until they met the firemen, when one said: "Make room and let de fiahmen pass in"; the other answered: "Make room, hell, ah's gonna make room and let dis niggah pass out."

An editorial on this subject in the Louisville *Evening Times,* commenting on the sane behavior of this audience, says:

> This quiet withdrawal was strange, but not so strange as the fact that it should be unusual under the circumstances.
>
> There is no reason on earth why a lot of people gathered under one roof should not be able to find the exits and use them expeditiously and without injury to anyone. Human beings with sufficient intelligence to find their way into a theatre should be able to find their way out in peace and quiet even if the house is threatened by fire. But the common experience is that there is frequently grave danger of a senseless rush for the doors and windows.
>
> Back of it all perhaps is the primal instinct of distrust for the stranger. People who meet in small groups and become thoroughly acquainted will rise to heroism in case of stress. Even on a blazing boat men will stand aside for the women and children. People on a boat develop a spirit of comradeship not unlike that felt in the home. But where a throng gathers at a place of amusement there is a feeling that if anything happens someone will act on the doctrine of "the devil take the hindmost."
>
> The audience last night should be recognized in some way. It should be advertised all over the country as an assembly of civilized human beings who had sense enough to act sensibly in what appeared to be an emergency. It should be reassembled and photographed.

I wish the camera man could have caught them as they were coming out. It would have been of inestimable value for educating the public to control themselves in times of emergency.

Safety News and Comment

World Chamber of Commerce

THE first annual meeting of the International Chamber of Commerce is to be held in London, June 27-July 1, 1921. The conference will be divided into five groups, to consider the subjects of finance, production, distribution, transportation and communications and devastated regions. The groups most likely to consider safety subjects are those of production and transportation and communications. The respective chairmen of these groups are Walter Leaf, representing Great Britain, and Walker D. Hines, representing the United States.

Dr. Hoffman Sailing Southward

DR. FREDERICK L. HOFFMAN of the Prudential Insurance Company started on June 1 for Chili, Bolivia, Brazil and other South American countries, accompanying the expedition organized by the Mulford Biological Laboratories to study the plant life of South America.

Pennsylvania Committee on Film Safety

DANA PIERCE, of Underwriters' Laboratories, has been named by Commissioner C. B. Connelley of the Pennsylvania Industrial Board to assist the Safety Standards Committee in drafting rulings pertaining to the exhibition of motion pictures in churches, schools, institutions, auditoriums and similar places of public assembly.

Sequel to Sprinkler Law Repeal

AFTER repealing the State law requiring apartment houses to be equipped with automatic sprinklers, the Massachusetts Legislature experienced sufficient change of heart to admit and pass a new bill for similar regulation. The new bill, now law, differed from the law repealed mainly in that it exempts from general sprinkler requirements new apartment houses having the first floor of "First Class" construction; this class includes steel and concrete only.

Commissioner of Public Safety Wilson and Fire Marshal Neal both gave their approval to the new measure, although it is a compromise with the influences in favor of relaxing standards of fire protection.

Dr. Copeland Campaigning Against Rats

BECAUSE of the recent agitation over dangers from plague on immigrant ships and its consequent introduction on an alarming scale throughout the United States, Dr. Royal S. Copeland, Commissioner of Health of the City of New York, has issued for wide distribution a request that all citizens join in an united effort to exterminate rats. The measures urged by Dr. Copeland include fumigation by sulphur, and "rat-proofing" buildings. Which reminds us that the most elaborate article on the rat plague, covering destruction of both life and property, is "The Menace of the Rat," by C. E. Worthington, published in SAFETY ENGINEERING, September, 1919.

Dr. Edward Bennett Rosa

DR. EDWARD BENNETT ROSA, chief physicist of the United States Bureau of Standards, Washington, D. C., died suddenly in his office at the Bureau of Standards on the afternoon of May 17. Dr. Rosa was born October 4, 1861, in Rogersville, New York, and was the son of Rev. Edward David and Sarah G. Rosa. In March, 1894, he married Mary Evans, of Harrisburg, Pa.

Dr. Rosa was graduated by Wesleyan University, Middletown, Conn., in the class of 1886, and was a member of the Delta Kappa Epsilon fraternity. After

leaving Wesleyan he entered Johns Hopkins University as a graduate student, and received the degree of Doctor of Philosophy in 1891. In 1906 the honorary degree of Doctor of Science was conferred on him by Wesleyan University.

For a short time he was instructor at the University of Wisconsin, leaving there to become professor of Physics at Wesleyan University. He became the chief physicist at the Bureau of Standards in 1901.

DR. ROSA'S SAFETY WORK

Dr. Rosa was for many years deeply interested in the prevention of industrial accidents, his first contact with this subject naturally being in the electrical industry.

When the American Mining Congress undertook an investigation of electrical accidents in mines, he was made a member of their committee. He entered actively into this work and the result was a publication entitled Standardization of Electrical Practice in Mines (Circular No. 23 of the Bureau of Standards). With the establishment of the Bureau of Mines as an organization especially devoted to safety in the mining industry this work was discontinued.

In 1913 the Bureau of Standards inaugurated an investigation into electrical accidents in general. This led to the development of a set of rules for the prevention of accidents, and had the close co-operation of the Committee on Accident Prevention of the National Electric Light Association. Two editions of a set of operating rules were published as Circular 49 of the Bureau. This now forms Part 4 of the National Electrical Safety Code, which was later published as Circular 54 in two successive editions. A final revision of this code was made in 1920, and as the third edition, has been published as Handbook No. 3. This work in electrical safety had the detailed attention of Dr. Rosa almost continuously from its inception. More detailed development of electrical safety standards was taken up in 1919 by the Electrical Safety Conference, Dr. Rosa serving as a member of this body to represent the Bureau of Standards. This conference has issued a safety standard for industrial control equipment and has other standards in course of development.

During the war accident prevention in the Federal industrial establishments was taken up and the Bureau of Standards was invited to assist in the formulation of a set of Federal safety standards. Dr. Rosa took up this work with his usual enthusiasm and co-operated in the development of the set of standards which has been published by the Emergency Fleet Corporation.

The demand for a similar set of standards for more general application soon became manifest, and it was due to Dr. Rosa's initiative that the Bureau of Standards undertook the development of a number of other safety standards for national use. The need for general co-operation in such work had been evident from the first, and two conferences to consider these safety standards were held in Washington in 1919. As a result it was generally agreed that this work should be carried on under the auspices and Rules of Procedure of the American Engineering Standards Committee, of which Dr. Rosa was a member and in whose possibilities of accomplishment he had enthusiastic confidence. The outcome of these conferences was a National Safety Code Committee, of which Dr. Rosa became chairman. He took an intense interest in its work, as a result of which a large number of National safety codes are now being developed.

Under Dr. Rosa's direction, the Bureau of Standards has undertaken the development of the following codes as either sole or joint sponsor: National Electrical Safety Code; Combined Fire and Safety Electrical Code; National Gas Safety Code; Code for Head and Eye Protection; Code for Lightning Protection; Logging and Sawmill Safety Code; Aeronautical Safety Code.

No More Fireworks in Philadelphia

THE Philadelphia City Council on May 26 passed an ordinance prohibiting the sale or use of fireworks except by persons licensed by the Mayor or Fire Marshal. For selling fireworks without a license a fine of $100 is provided.

An enabling act was necessary on the part of the State Legislature of Pennsylvania before this ordinance could be passed by the Philadelphia Council, where it was favored by a vote of 20 to 1.

South Africa Has Safety Exhibition

DURING March a mining exhibition was held at Johannesburg by the Amalgamated Technical and Scientific Societies. There were exhibits of "Safety First" educational literature, accident prevention devices, posters, and also a safety museum.

The safety devices and inventions which won prizes were as follows: (1) Patent fuse holder, by S. B. N. Hill, manager of Breyten Collieries, Ltd.; (2) Safety clamp for mill stems, by James P.

Young, of Meyer and Charlton G. M. Co., Ltd. Another device was a wire face-mask for protecting the face of a workman engaged on repairs to boiler tubes; this answers equally well for steel-chipping work. The mask is made of light netting with a mica protection for the eyes, and is adjusted by elastic bands which may be worn either under or over head apparel.

One of the best exhibits was a model emergency station erected according to the recommendations of the mine rescue committee, and comprising every article of equipment necessary for the efficient rendering of first aid on the mines. The floor area was 200 sq. ft., which is the rescue committee's standard, and provides reasonable room for dealing with stretcher cases. With the exception of the Red Cross plank stretchers and regulation standard first aid boxes, the various articles of equipment were finished in white enamel, which not only preserves the equipment but also enables the ambulance officer to notice, and get rid of, the dust and dirt which accumulates so quickly, and which is a menace to all first aid material.

Two Red Cross plank stretchers (one with a suitable length of rope) were equipped with first aid box and blankets in readiness to proceed in answer to the accident signal.

American Atmos in New York

INTEREST is attached to the opening by the American Atmos Corporation of a New York sales office which will be located in the Tilden Building. This office will be the headquarters of F. F. Morris, president of the company. George Oliver Smith, vice-president and chief engineer, will also spend a good deal of his time here. At the New York office will be found a complete exhibit of all the apparatus manufactured by the company so that customers can see at a glance how extensive its line is. C. L. Turner, lately associated with Mr. Smith in the Doherty organization, is now connected with the American Atmos Corporation in the capacity of sales engineer. He and Mr. McDaniels are now covering the East.

Protecting Rubber Mill Mixing Rolls

AT the spring meeting of the Engineering Section, National Safety Council, held jointly with the Cleveland Engineering Society, C. B. Mitchella, engineer of design and construction of the B. F. Goodrich Rubber Company, read a paper on the safeguarding of rolls of mills used in rubber factories, where accidents still occur, in spite of the recent improvements of installation.

"The most serious accidents on mill rolls," Mr. Mitchella said, "are caused when the hands pass into the bite of the rolls in an attempt to regain foreign articles or to assist stock through the rolls by pushing with the hands, or by hands being caught in the folds of the stock because of improper position of the hands when cutting; or getting the hand beyond the top of the roll for any reason. Fingers are also pinched under the guides at the ends of the rolls."

Prevention means either the development of a perfect workman from the safety point of view, or an automatic feeding device which will permit the operator to stay a safe distance,—at least 40 inches,—from the bite of the rolls. No attempt at such a feeding device has been successful. Certain safety measures and equipment can be used, however, to reduce the frequency and severity of accidents which cannot be absolutely prevented.

"The front edge of the mill pan should, if possible, be located at this extreme limit, or a bar or pipe guard may be placed across the mill instead. The height of the top of mill rolls should be no less than 50 inches above the floor upon which the operator stands, and this may be increased to 54 inches without decreasing efficiency of workman. The speed of mill rolls should not exceed 25 revolutions per minute. On rubber mixing mills it is best to provide a conveyor apron for carrying stock into and from the rolls. This apron reduced almost wholly the necessity of placing the hands on the rolls during the mixing operation."

To avoid crossing the arms, "cutting and rolling of stock should be done as follows: When cutting from left to right,

cut with right hand and fold with the left. When cutting from right to left, cut with left hand and roll with the right.

"Workmen should not try to push stock into the rolls with their hands. A wooden paddle or pusher should be used instead. This wooden pusher is especially desirable on cracker mills, and may be installed on a horizontal adjustable lever with handle over front roll. Where the guide bears against the roll it should be constructed of a metal which will not score the roll, and should fit the roll snugly. The floor adjacent to the mill should not be slippery."

Because the workman cannot be prevented from taking unnecessary risks, even by these provisions, accidents will sometimes take place, and therefore there must be a device for stopping the rolls quickly. The best device in Mr. Mitchella's experience is the electric clutch brake.

"The electric current controlling the clutch should, in emergency, be opened by one of two horizontal throw-out bars placed the entire width of each mill above the rolls at a maximum height of 6 feet above the floor upon which the operator stands, and in plan be located 18 to 21 inches to the front and rear of the bite of the rolls. These bars should, with the least amount of travel, open an electric switch placed upon one housing of each mill. The electric switch may be opened with the least travel of throw-out bar by gearing up the switch spindle to the throw-out bar levers in a ratio of about 5 to 1. It should not be necessary to move the safety bars more than 3½ inches either up or down. The travel of the safety bar may be limited by an adjustable stop which prevents damage to the electric switch by being thrown too far. It should not require more than a 5-pound force on the safety bar to throw the switch. The switch should be enclosed in a dust-proof box.

"The clutch brake should be capable of stopping the rolls with no greater surface travel than about 4 inches with the rolls loaded. I have never witnessed any tests where empty mill rolls have been stopped with less than 8 inches travel, but I think this may be considered a safe minimum for the reason that there should be no operations nor accidents on empty mill rolls.

"Installations have been made with an individual clutch on each mill. This does not provide as quick stopping as if all the mills were driven by one clutch.

"The electric circuit feeding the clutch and brake solenoid should be fed through circuit breakers which are held closed by a solenoid operated latch. After the clutch circuit is opened it ought to be impossible to close the circuit breakers except by operator's going to panel board and resetting by hand. With this arrangement the clutch cannot be electrified immediately after the safety throw-out bars have disengaged it.

"Another safeguard which is often forgotten is a facility for quickly separating the rolls after a workman's hands have been crushed. The mill rolls should never be reversed to extricate an injured workman, as this will greatly increase the injuries. The mill rolls are hot and by separating them quickly, severe burns will be prevented. Perhaps the simplest means for accomplishing this separation is to construct the mill roll adjusting screws of large pitch Acme type threads. It will be necessary then to place a clamp on this adjusting screw to prevent vibration backing it out of position and allowing the rolls to separate during the operation of the mill."

Engineering Research Foundation

SPONSORED by the Division of Engineering of the National Research Council, the Engineering Foundation has been launched to raise and administer a fund for engineering research. It has offices at 29 West Thirty-ninth Street, New York City. A. D. Flinn, secretary of the Foundation, has recently issued a symposium on benefits to industry resulting from research scientifically carried on.

The National Research Council's Division of Engineering and Engineering Foundation, the president of which is Charles F. Rand of New York, have enlisted many of the nation's research specialists and executives in leading industries to prosecute a permanent national movement to stimulate research in the

industries and to bring about co-operation in the acquisition of new scientific knowledge for dissemination among engineers and managers of American industry. Aiding in the work are the great national societies of civil, mining and metallurgical, mechanical and electrical engineers.

A fund is being raised under the direction of Mr. Rand to put American research on a scientific and enduring basis.

Rubbish Court in Denver

EVERY Thursday afternoon at three, in the City Hall, Denver convenes its Municipal Rubbish Court. This institution was created July 15, 1920, to discipline by admonition and instruct first offenders against city ordinances for the proper disposal of refuse. It does not impose fines; second-complaint cases are prosecuted in the municipal police court. Twenty cases a week was its opening quota, and its influence is held to reach far beyond its doors.

Chicago Fire Anniversary Observance

OCTOBER 9, the anniversary of the great Chicago fire, is to be observed as Fire Prevention Day. The utilization of this date in the city's history to teach civic safety is being pushed by the Bureau of Fire Prevention and Public Safety of the Chicago Fire Department, the Committee on Fire Prevention of the Chicago Safety Council, the National Fire Protection Association, and other groups interested in fire hazards.

Hypochlorite For Oyster Purification

ON the application of oystermen in the Raritan Bay producing area, where sewage pollution had become so great that health authorities planned to prohibit direct marketing of shellfish, the State Conservation Commission of New York recently conducted a series of experiments in purification by treatment with commercial hypochlorite of calcium. The demonstration was conducted in Great Kills Harbor, under the direction of Sanitary Chemist William F. Wells, and was, by invitation of the State Conservation Commission of New York, under official observation by representatives of the Bureau of Chemistry of the United States Department of Agriculture and by the United States Public Health Service.

As reported in Public Health Reports, April 22, 1921, by F. A. Carmelia, Passed Assistant Surgeon of the Public Health Service, who was the observer for his organization, the experiment was hampered by the unwillingness of oystermen to do out-of-season dredging enough to secure oyster stock in large commercial quantities. Credit is given to Mr. A. F. Merrill, of the Merrill-Haviland Oyster Company, as having alone provided the essential oyster stock, the necessary handling, and the floating equipment. The special lots of heavily polluted oysters tested were supplied from Jamaica Bay by Mr. John Schmeelks. With the co-operation of these two oystermen, the tests were successful from the commercial point of view as well as the scientific. The published report concludes: "In oysters scoring in the neighborhood of 50 or more, an average reduction of 90 per cent of the *B. coli* content can be confidently expected from the process."

Lightning Protection Program

THREE very instructive technical papers on lightning protection were presented at a dinner-and-reception meeting of the Chicago Section, American Institute of Electrical Engineers, on the occasion of its 365th technical meeting, held jointly with the Electrical Section, Western Society of Engineers. The papers were as follows:

Studies in Lightning Protection on 4,000-Volt Circuits, by D. W. Roper, Commonwealth Edison Company, Chicago;

Lightning Arrester Spark Gaps, by Chester T. Allcut, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.; and

Life and Performance Tests of O. F. Lightning Arresters, by N. A. Loungee, General Electric Company, Schenectady, N. Y.

Another paper not on this aspect of the subject was by V. E. Goodwin, of General Electric Company at Pittsfield, Mass., on electrostatic condensers.

Building Problems Discussed

THE proceedings of the Philadelphia and National Conferences on the Construction Industries, detailing the results of the Philadelphia Conference, February 15-18, under the auspices of the Industrial Relations Committee of the Philadelphia Chamber of Commerce, and the National Conference in Chicago, March 2 and 3, under the auspices of the National Federation of Construction Industries, general offices, Drexel building, Philadelphia, form a book of 254 pages which can be obtained at the net cost of $2 from the Industrial Relations Committee, 1414 South Penn Square, Philadelphia.

The publication covers a wide variety of allied subjects such as Trend of Prices and Wages, Decline in Business and Mercantile Failures, New Buildings and Their Cost, Bank Clearings, Labor Troubles, Housing Problems, Savings Banks and Strikes.

Unfortunately, SAFETY ENGINEERING has been unable to find anywhere in the index the words "Accidents" or "Safety," subjects which seem to have been overlooked in the conferences. Yet both safety and its antithesis, accidental injury, are of extreme importance in considering economics of this kind.

In spite of the omission there is a good deal in the book of interest to safety supervisors who have charge of the well-being of workmen. As the book is carefully edited by John Price Jackson, assisted by G. W. B. Hicks and John L. Clarkson, it is well worth its price, which was designed to cover merely the cost of printing, postage and wrapping.

Thunderstorm Safe-Conduct Measures

THE State Fire Marshal of Louisiana has anticipated the electric storms of the summer season by issuing precautionary instructions:

If you find yourself indoors during a thunderstorm don't go near the stove; keep away from the chimney, and avoid using the telephone; also, don't touch a screen door

Out of doors during a thunderstorm the safest place is in the woods. Lightning may strike a tree, but it is not likely to be the one under which you have taken shelter. On the other hand, the most foolish thing you can do is to stand beneath an isolated tree. An open shed especially if it is some distance from larger buildings, is nearly, if not quite as dangerous.

Never go near a wire fence during a thunderstorm.

Nine-tenths of the annual mortality from lightning occurs in the rural districts, including under this head towns and villages of 2,500 inhabitants or less.

Dangers of Oil on the Waters

LAST year the National Board of Fire Underwriters undertook an investigation of the hazard to water-front properties from the oil pollution of harbors and adjacent waters. A New York meeting was held on October 13, 1920. A questionnaire was sent to all seaport fire chiefs to ascertain the amount and danger of oil deposits in American harbors.

A recent harbor fire was that at New Orleans on December 16, 1920. From the Federal and municipal authorities in charge of the port of New York, where the tide range is about 7 feet, the report published by the National Fire Protection Association reads: "Much oil on water at times and forming coating on piles, etc. Bathing ruined on adjacent beaches."

On December 1, the Supervisor of New York harbor and three other representatives of interested organizations appeared before the House Committee on Appropriations to urge increased funds for the prevention of oil pollution. On December 10 a meeting was called at the New York office of the National Board of Fire Underwriters to formulate an amendment to the present river and harbor legislation.

On January 5, 1921, a second meeting was held at the rooms of the National

Board, at which the following interests were represented: United States Supervisor of New York Harbor, United States Steamboat Inspection Service, New York Department of Docks and Ferries, New York and New Jersey Dry Dock Association, marine salvage and tank cleaning corporations, beach land improvement interests, marine underwriters, railroad and other insurance interests, New York Board of Fire Underwriters, National Board of Fire Underwriters, and the National Fire Protection Association Committees on Docks, Piers and Wharves, and on Marine Fire Hazards.

Another meeting in New York was held on February 18, then the following, in addition to insurance interests, were represented: United States Navy Department, War Department, various owners of water-front properties, New Jersey Board of Shell Fisheries, New York Dock Department, Coast Resorts Association, U. S. Bureau of Mines, salvage companies, various oil companies and the American Petroleum Institute. For New York harbor and vicinity, it is suggested that steps be taken to establish a dumping ground somewhere on the Newark or Hackensack meadows. It was the sense of the meeting that the American Steamship Owners' Association be notified of the proposed legislation and their help requested toward the establishment of some form of oil and oil sludge disposal system.

While all this consideration is being given to oil dangers from marine discharge, on May 23 another oil danger caused the burning of the historic vessel, "Granite State," in the Hudson river off West 97th street, New York. This vessel was commissioned in 1818, and served in three wars; her last assignment was as a New York Naval Militia training ship. Her loss in a fire that lasted three days was caused by the accumulation on the river of oil leakage from a Standard Oil pipe-line.

"Searching for the cause of the conflagration," a local newspaper said, "Fire Marshal Willis found that a leak from a 6-inch Standard Oil pipe-line which crosses under the Hudson from 98th street to Shadyside, N. J., indirectly was responsible. The pipe had been leaking for some time." The indirection of this cause does not diverge widely from the direct. The only reason apparent why the leak should not be stated as the cause is that the oil which "had been leaking for some time" and neglected, floated in a pool on the surface, was on May 23 augmented by a sudden increased flow occasioned by the dilatory repairs of the Standard Oil Company on the first "indirect" cause. The means of ignition was back-fire from a small motor-boat, which was immediately destroyed. Besides the loss of the "Granite State," this fire destroyed the personal property of many of the militia officers and men who made their homes on board their training-ship, and damaged the three-story naval office and storehouse on the 96th street pier.

Detroit Has Poster for Kitchens

THE Detroit Board of Commerce has published through its Fire Prevention Committee a hanging kitchen-poster giving the locations of the nearest fire alarm boxes for different sections of Detroit, with instructions on how to turn in a fire alarm and household hints on fire prevention. The poster is being distributed by the Michigan Inspection Bureau, Real Estate Exchange, Detroit, and will be sent to readers of SAFETY ENGINEERING upon request.

Zinc Chloride Burns

DRS. Carey P. McChord and C. H. Kilker, in the *Journal of the American Medical Association* for February 12, 1921, report poisoning in a wood-preserving plant where railroad ties are weather-proofed and fire-proofed by treatment with tars, creosotes, and zinc chloride. Skin troubles were found among all employes handling the ties, both from the tar and from the zinc chloride, although the solution of the latter used was too weak to cause burns. This was due to evaporation of the treating fluid on the ties after exposure, and was treated with sodium bicarbonate.

Various experiments to prevent contact between the bodies of the workers and the treating solution were then made. Leather gloves and garments were found to be impracticable because of shrinkage of the leather; rubber was also unsatisfactory on account of expense and lack of durability. An acid- and waterproof canvas overall and flexible "linoleated" canvas gauntlets were adopted for the use of workmen. These garments, together with prompt treatment of all trivial injuries, effected the disappearance of zinc chloride burns from the plant.

Miners' Phthisis Prevention

THEORETICALLY speaking, there is no reason why silicosis, or miners' phthisis, should not be entirely unknown, according to Dr. Orenstein in an address before the South African Technical Societies' Club. Since silicosis is caused by dust arising from siliceous rock when it is drilled or hammered, it should be prevented by the elimination of this dust. It rests partly with the individual to create a large or a minimum quantity of dust, and partly with the engineers of mines to provide adequate watering appliances, air removal and ventilation to remove the dust which is necessarily produced.

Canadian Safety Organisation

THE Ontario Safety League and the Canadian National Safety League have recently issued their annual reports for the work of the year 1920. Both organizations are devoting themselves to "an effort to present the safety idea to the public throughout the country."

A two-day Safety convention was held in Toronto on April 27 and 28. Last October 10-16 was proclaimed "Safety Week" by the Ontario Provincial Government, and very thoroughly organized by the Ontario Safety League, with the assistance of the Kiwanis Club in Ottawa, the Chamber of Commerce in Hamilton, and local committees throughout the province.

One of the chief functions of the Canadian National Safety League is to secure the formation of other provincial safety leagues than those of Ontario, now in its eighth year, and Manitoba, just organized in 1920. It already has local members in 14 cities.

British Compensation Costs Lower

BRITISH statistics compiled under the Workmen's Compensation Act and recently published show for 1919 for the seven chief industries a total direct compensation payment of £4,616,723.

"These would appear to be lower figures than are usually published for the normal year, as there are many records of even a greater demand for continual toll in life and limb upon our industrial community," according to *Safety First*, May, 1921.

"During the period 1910-1919, the huge sum of £35,000,000 was disbursed in settlement of 37,287 fatal and 4,032,-614 non-fatal accidents. Official statistics show that in 1919, 1,384 persons were killed, and 124,638 were injured in workshops and factories alone."

Horsehair Processing Regulations

THE Pennsylvania Industrial Board meeting on May 24, 1921, adopted tentatively the following regulations based on an investigation of the horsehair dressing industry by the Division of Hygiene and Engineering:

That all horsehair, as early as possible, in the process of its manufacture, preferably before the bales are opened, or with the minimum amount of handling after the bales have been opened, undergo one of the following processes:

1. Subjection to dry heat at a temperature of 200° F. for 24 hours.
2. Subjection to steam at 15 pounds pressure for a period of two hours.
3. Boiling with the hair constantly covered with boiling water for three hours.

British Safety Conference

ON May 11, 1921, the second annual general meeting of the British Industrial "Safety First" Association was held in Caxton Hall, Westminster, London. Lord Leverhulme of the Port Sunlight and other industries is president of this association.

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

G. E. Sanford, Pres. C. Van Horn, Treas. F. A. Doody, Sec.
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Albert S. Regula, Liberty Mutual Ins. Co. Rowland H. Leveridge, N. J. Dept. of Labor. J. Albert Robinson, Grinnell Co.
Regular Meetings—Fourth Friday of Each Month from September to June at 8 P. M. Next Meeting September 23.

PROCEEDINGS OF THE MAY MEETING

THE May meeting realized the hopes of the program committee when it was found that the room reserved for the evening was far too small to accommodate the crowd and an assembly hall several sizes larger had to be prepared at the last moment.

After the few moments which it took to make the transfer, President Sanford introduced H. S. Balliet, assistant terminal manager of the Grand Central Station, who spoke on "Electrical Hazards and Their Safeguards: Terminal Equipment of the New York Central Railroad Entering New York City." The substance of this paper will be printed; it was illustrated by many slides showing various stages of the work of constructing this terminal without interruption to traffic, and the great expense incurred to safeguard the workmen and the traveling public.

Messrs. C. O. von Dannenberg and M. M. Samuels, electrical engineers with J. G. White Engineering Corporation, spoke on "High Tension Electric Generation and Transmission." Their illustrations were of safe equipment used for long distance and high tension lines. Mr. L. E. Smith, electrical engineer of the General Electric Company, showed pictures of everyday methods of safeguarding electrical lamps, motors, etc., describing them in an interesting and instructive manner. W. E. Grippen, member A. S. S. E., ran the lantern.

The four papers consumed all the time available, so there was no discussion.

SAFETY FOR GOVERNMENT EMPLOYES

THE attention of the Society has been called to the serious neglect of safety construction, safety inspection and safety education on the part of the Federal Government.

This was recognized by the Congressional Joint Commission on Reclassification of Salaries which reported over a year ago (March, 1920) and summarized its finding as follows:

"That Government buildings in Washington are generally clean and well kept, with sufficient toilet and washing facilities, but that as regards such important matters as working space, illumination, ventilation, rest rooms, and medical and surgical emergency relief there is neither adequate provision nor accepted standard.

"That the Government is paying heavily in the form of employes' compensation, as well as in loss of time and efficiency, for its failure to adopt a thoroughgoing safety program. In safe construction, safety inspection, and safety education the Government falls far short

of meeting the standards set by the more progressive States, municipalities and private employers."

In certain departments (such as the Navy Department) there are some places in which safety work of a high order is being done, but there is a lack of any thoroughgoing safety policy and a large percentage of Government work is surrounded by hazards which would not be tolerated, very long, in private industry.

A reasonable safety plan will save the Government more than it will cost and serve to create and maintain a more efficient personnel.

CODES AND LEGISLATION COMMITTEE

THE Codes and Legislation Committee in taking up the matter of shutting off gas supply in case of fire have met with the problem of large gas mains and meters for which there seem to be no safety devices available. The committee requests suggestions from the membership as to how these large gas installations can be controlled. Instances have been cited of gas meters 20 feet long with an intake pipe as large as 16 inches. Members who have had experience with installations of this sort are invited to communicate, at their early convenience, with this committee.

The Society has been applying for sponsorship of a number of national safety codes and it is requested that members of the Society communicate with the secretary stating the lines of industry with which they are especially familiar and whether or not they would be able to work on any of the Society's Code Committees.

AFFILIATION WITH THE A. S. M. E.

AS the demand among the members of the American Society of Mechanical Engineers for the formation of a Safety Section has become insistent, approaches have been made towards affiliation between the A. S. M. E. and the A. S. S. E on a basis of mutual advantage.

The terms offered do not in any degree affect the self-government of the Society, permitting it to retain its complete identity while serving in a most thorough way the safety needs of the A. S. M. E. It was therefore voted by the directors to approve the plan offered and to request action to consummate the affiliation.

MEMBERSHIP CAMPAIGN

The Executive Board requests the personal efforts of every member in securing new members at this time. The society is carrying on very important work which needs additional support, the following being some of the accomplishments:

The Head and Eye Protection Code which we helped to prepare is now about ready for distribution.

The Ladder Code Committee has completed its first tentative draft which will be ready for presentation to the society for public discussion at the September meeting.

The Elevator Code, in the preparation of which the society took an active and influential part, is completed but publication has been held up by printers' strike.

We have been invited to co-operate with the Society of Automotive Engineers in the formulation of a Safety Code on Aeronautics.

The National Safety Code Committee has recommended to the American Engineering Standards Committee that this society be awarded sponsorship for the Safety Code on Compressed Air Machinery.

The award of additional codes to this society is being considered and will be determined by our ability to carry on the work.

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 465 AN HOUR-A-DAY STAFF PHYSICIAN.—In order to make the work of our factory nurse and first-aid hospital more effective, we decided about six months ago to obtain the services of a physician-surgeon for one hour daily, during which time his advice and service were furnished free of cost to any employe.

Out of a total of approximately 500 people there have been an average of from 8 to 10 people seen by the doctor during the hour he spends here daily.

We believe that his advice has been of considerable value in teaching our employes how to take better care of themselves, and checking epidemics by using preventive measures early enough to be effective.

His advice and service have been of great assistance to our factory nurse in her work, and the experiment so far has been very satisfactory.

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No. 466 "SAFETY STEVE" AND "THE MAN ON THE JOB."—"Safety Steve" is a well-known character throughout our plant and the writer wonders if other plants have a similar person working for them. Very few men in the plant really know "Safety Steve" by sight but they have read his sayings and have taken notice of his plant magazine articles. He sends out a letter bi-monthly to about 200 foremen and, by means of these letters, he keeps them in close touch with the safety movement.

One of these letters contained a blueprint graphic report of the accident record this plant had made over a period of years. Another gave the cost figures for accident compensation and medical service along with the regular form letter. Here is a copy of one of the letters recently received from "Safety Steve:"

Mr. Foreman,

Dear Sir: You recall the story of Tom Sawyer, who was told to white-wash the old fence, and then the gang came along and tried to persuade him to drop the job and go along to the swimming hole. Tom gave them to understand the importance of his job and the enjoyment he was getting out of it.

Soon the bribes came thick and fast and Tom had a wonderful assortment of prizes for allowing the gang to finish the job. The work was accomplished easily while Tom looked on because he sold his idea to the gang.

This story of Mark Twain's illustrates a principle which we can't get away from in promoting safety.

"SAFETY STEVE."

The writer suggests that safety engineers see to it that a character such as "Safety Steve" is put on the payroll at their plants. They will be surprised to see the results he will bring.

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No. 467 HORSE-PLAY AND ACCIDENTS.—Webster has defined horse-play as rude, boisterous play. If he were living today, and was familiar with our industrial institutions, he might go further with this definition and say that horse-play was the cause of numerous accidents, some of which resulted in death,

for which no guards could be provided.

The modern industrial concern with its hundreds of workmen of all types and classes of men must furnish an outlet for the spirit of play inherent in each individual. In the past, this spirit has been manifest in the practical jokes, fooling and scuffling practiced whenever the boss was out of sight.

They tell the story of a workman in one of our large factories where smoking was prohibited who was severely burned because of a practical joke. The injured workman was in the habit of leaving his work and going to an adjoining room to indulge in the prohibited practice. A fellow employe discovered the hidden supply of tobacco of the offender, and, *for a joke,* mixed powder with it. The powder exploded and blew the blazing tobacco into the victim's eye, burning it severely. Whether this was horse-play or practical joking the lesson should be taken to heart.

Another story is told of an office employe who broke a paper clip into two parts, and, by using a rubber band, shot half of the clip across the room and into a fellow employe's eye.

Fooling and scuffling are two elements of danger that are prevalent in every institution where labor is employed, especially in those establishments employing boys or young men. Misuse of forced air and wrestling are common.

How to successfully stop these dangerous practices has been a problem that has engaged the attention of many employers and safety supervisors.

Many schemes have been tried to overcome this dangerous practice and strict rules have been issued against it. It has been found that the appeal to the hearts of the boys, arousing their humanitarian instincts, and impressing upon them the serious consequences and responsibilities which they may be obliged to bear is one of the most effective methods used. By far the best plan, however, is to supply a place where all who are inclined to such things may work off their excess of spirits with little danger to their fellow employes either through "horse-play" or "practical joking."

Prizes for May Articles

First Prize. No. 462. C. A. Briggs, Safety Director, Willys-Overland Co., Toledo, Ohio.

Second Prize. No. 464. Otway Conard, Liability Department, Standard Accident Ins. Co., Detroit, Mich.

Honorable Mention, No. 463. J. J. Kennedy, Member of District Safety Board No. 1, State of Washington, Spokane, Wash.

Comments by Members of the Committee

The three articles in the May number are hard to judge, as each has its merits. Probably the first article, No. 462, is the most useful and will benefit the greatest number of readers, although the article concerning safety in the small plant, No. 463, will no doubt open the eyes of a lot of men, working in the smaller plants, who are now letting such opportunities pass by. The last article, No. 464, is very true. Insurance inspectors have done a lot to start and promote safety work. The writer, however, had the management in mind when he wrote, rather than The Man On The Job.

Another member of the committee says: No. 464 has treated us to a sensible eulogy on the merits of the insurance salesman as the medium of introducing safety in industrial plants. In selling safety from a financial point of view, one of his strong arguments must be the conserving of human life and the prevention of accidents, not only from the humanitarian aspect, but from the compensation expenses involved.

No. 462 is interesting and No. 463 reveals a safety engineer with "pep," but our vote is cast in favor of No. 464 as deserving of the first prize.

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy loss by fire and in saving lives.

GARAGES AND AUTO REPAIR SHOPS

December 16, 1919. Hammond, Ind. Midway Garage, Johnson and Hoffman streets. Storage warehouse. One 1-story building destroyed. Walls, brick. Floors, wood. Roof, composition. Cause, unknown. Fire started in east end of building. Discovered by watchman about 2.50 a. m. Alarm, telephone. Duration, 8 hours. Stopped in same building. Fire was retarded by fire walls. Private fire apparatus, none. Persons in building, none. Means of escape, 2 big double doors. Value of building and contents, $25,000. Property loss, $20,000.

January 2, 1920. Boyertown, Pa. Union Garage, property of Harry A. Trent, North Reading avenue. Fire in one 2-story building. Walls, brick. Floors, maple. Roof, tin. Cause, electric wire. Fire started under an automobile. Discovered by workman at about 5.30. Alarm, telephone. Duration, ½ hour. Stopped; very little damage done. Private fire apparatus, none. Persons in building, 6. Killed, none. Injured, none. Value of building and contents, $4,500. Property loss, none.

January 3, 1920. Malad, Ida. Garage, Main street. One 1-story building destroyed. Walls, brick. Floors, cement. Roof, tar and gravel. Cause, short circuit from car. Started rear of building. Discovered by people in front of building about 9.00 p. m. Duration, about 2 hours. Stopped at building of origin. Fire was slightly retarded by construction of building. Firemen handicapped by lack of equipment and water pressure. Private fire apparatus, hose in center of building. Persons in building, none. Means of escape, front and rear doors. Value of building and contents, $85,000—$95,000. Property loss, $65,000—$75,000.

January 6, 1920. Dubuque, Ia. Fluckiger Motor Co., 490 Clay street. Automobiles, supplies, and repairs. One 2-story building damaged. Walls, brick. Floors, ordinary joists and 2" flooring. Roof, gravel. Cause, short circuit electric wires. Fire started on second floor. Discovered by man using trouble light at time, about 8.55 a. m. Alarm, box. Duration, 2 hours. Stopped at second floor. Fire was favored by heavy smoke from burning oil and gasoline, preventing the firemen's getting into building. Firemen handicapped by frozen hydrant. Private fire apparatus, none. Persons in building, 6 or 8. Killed, none. Injured, none. Means of escape, one stairway in center of building. Value of building and contents, $75,000. Property loss, $21,000.

January 14, 1920. Slatington, Pa. Francis Kunkle's Garage, South street at corner Chestnut alley. Garage and repair shop. One 2-story building destroyed. Walls, concrete on frame. Floors wood. Roof, slate. Cause unknown. Fire started in southeast corner of building, on outside. Discovered by outsider going home from work at about 3 a. m. Alarm, telephone. Duration, 1 hour. Totally burned to basement walls. Fire was favored by frame construction of building. Firemen handicapped by cold weather, snow, and high western winds. Private fire apparatus, none. Persons in building, none. Value of building and contents, $20,000. Property loss, $20,000.

January 17, 1920. Pana, Ill. Pana Motor Car Co., N. W. Corner Second and Poplar streets. Garage; auto repairing and painting. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roof, slate trussed. Cause, defective flue. Fire started at wooden plate on top of brick extending into the flue. Discovered by pedestrians on street at about 8.50 a. m. Alarm, street box. Duration, 4 hours. Stopped at second floor. Fire was favored by brick walls, except high ceiling on third floor. Firemen handicapped by low water pressure, shortage of men, and bursting of hose. Private fire apparatus, 1 350-gallon Seagrave booster pump, which saved building. Without it the whole building would have been destroyed. Persons in building, 8. Killed, none. Injured, none. Means of escape, stairways and fire escape from third floor. Value of building and contents, $50,000. Property loss, $15,000.

January 24, 1920. Kenosha, Wis. Buick Garage, 915 Salem avenue. One 1-story building partly destroyed. Walls, brick. Floors, cement. Roof, gravel. Cause, probably crossed wires in one of the cars. Fire started in garage. Discovered by employe at about 6.40 a. m. Alarm, verbal. Duration, 15 min-

utes. Stopped at garage. Private fire apparatus, none. Persons in building, none. Killed, none. Injured, none. Value of building and contents, $20,000. Property loss, unknown.

January 24, 1920. Bentleville, Pa. Garage, Main street. Automobile repair shop. One 1-story building destroyed. Walls, tile. Floors, earth. Roof, paper. Cause, gasoline. Fire started in office. Discovered by employes at about 8.30 a. m. Alarm, fire whistle. Duration, 2 hours. Stopped at garage. Fire was retarded by tile walls. Firemen handicapped by having no fighting equipment. Private fire apparatus, none. Persons in building, 5. Killed, none. Injured, none. Means of escape, front, rear, and side doors. Value of building and contents, $60,000. Property loss, $15,000.

January 27, 1920. Erie, Pa. U. S. Garage, 5th and French streets. One 1-story building partially destroyed. Walls, concrete block and brick. Floors, cement. Roof, wood and steel. Cause, gasoline explosion, as man carried gas past stove. Fire started in front of building, east side. Discovered at about 11.45 a. m. Alarm, fireman hearing explosion, pulled box. Duration, about 3 hours. Confined to east half of building. Fire was favored by construction of roof. Private fire apparatus, extinguishers. Persons in building, 8. Killed, none. Injured, 3 firemen (assistant chief seriously), by falling walls. Means of escape, good. Value of building and contents, $200,000. Property loss, $25,000.

February 4, 1920. St. Louis, Mo. Igou Auto Garage & Repair Co., 4333-4337 Warne avenue. Auto repair shop, garage and salesroom. One 1-story building destroyed. Walls, brick. Floors, wood. Roof, composition. Cause, unknown. Fire started on first floor, rear. Discovered by workman at about 12.10 a. m. Alarm, street box. Duration, 4 hours. Confined to building. Fire was favored by construction. Private fire apparatus, none. Persons in building, 1. Killed, none. Injured, none. Value of building and contents, $45,000. Property loss, $30,865.

February 9, 1920. Atlanta, Ga. Garage property of the P. O. Dept., 12 Pudunut avenue. One 4-story building destroyed. Walls, brick. Floors, wood. Roof, tar and gravel. Cause, unknown. Fire started on second floor. Discovered at 3.42 a. m. Alarm, telephone. Duration, 3 hours. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, none. Injured, 2 (firemen). Value of building and contents, $200,000. Property loss, $150,000.

February 16, 1920. Sioux City, Iowa, F. X. Babue Building, 305-307 Jackson street. Carpentry, auto repairing and storage, and tents and awnings. One 2-story building partially destroyed. Walls, brick veneer. Floors, wood. Roof, paper and gravel. Cause, unknown. Fire started on second floor in tent and awning factory. Discovered by pedestrian passing at about 7.57 p. m. Alarm, box. Duration, about 5 hours. Front part of building nearly destroyed. Fire was favored by wooden floors and inside construction; floors were saturated with oil. Private fire apparatus, none. Persons in building, none. Means of escape, stairway. Value of building and contents, $35,000. Property loss, $18,000.

February 19, 1920. Denver, Colo. Roberts Auto Company Garage, 1235 Broadway. One 2-story building damaged. Walls, brick. Floors, cement. Roof, gravel. Cause, careless handling of gasoline. Fire started in rear of building. Discovered by employe at about 11.40 a. m. Alarm, telephone. Duration, about 1 hour. Value of building and contents, $150,000.

February 19, 1920. White Hall, Ill. Hudson Garage, corner Main and Franklin streets. One 1-story building destroyed; 2 others partly. Walls, wood, except front of garage, which was brick. Floors, concrete. Roof, rubber. Cause, gasoline. Fire started in workshop. Discovered by men who were at work at about 1.30 a. m. Alarm, fire bell, night watch ringing. Duration, 3 or 4 hours. Stopped at garage. Fire was favored by construction of building. Private fire apparatus, hand fire extinguishers. Persons in building, 4 or 5. Killed, none. Injured, none. Means of escape, large doors at front and rear. Value of building and contents, $10,000-$15,000. Property loss, $5,000.

February 21, 1920. Philadelphia, Pa. Western Garage, 220-222 South 40th street. One 2-story building destroyed. Walls, brick. Floors, wood. Roof, gravel. Cause, spark from broken electric globe. Fire started first floor rear. Discovered by employe at about 12.35 p. m. Alarm, box. Duration, 3 hours. Stopped at second floor. Private fire apparatus, extinguishers. Persons in building, unknown. Killed, none. Injured, none. Means of escape, none.

February 27, 1920. Birmingham, Ala. Smith Motor Car Company, 121 South 21st street. Garage. One 3-story building damaged. Walls, brick. Floors, wood. Roof, gravel. Cause, unknown. Fire started on second floor. Discovered at 7.02 p. m. Alarm, telephone. Duration, 10 minutes. Persons in building, unknown. Killed, none. Injured, none. Means of escape, fire escapes and stairway. Value of building and contents, $26,500. Property loss, $1,000, (smoke damage only).

March 1, 1920. Detroit, Michigan. Frank P. Gmelin Co., 998-1000 Woodward avenue. Salesroom and garage. One 1-story building damaged. Walls, brick. Floors, cement. Roof, composition. Cause, supposed short circuit of charging battery wires. Fire started in rear of building. Discovered by employes at 7.09 a. m. Alarm, telegraph. Duration, 2¾ hours. Confined to building. Private fire apparatus, none. Approximate value of building and contents, $99,419. Property loss, $14,403.

March 6, 1920. Lambertville, N. J. Charles Reading's Garage, Elm and George streets. One 2-story building destroyed. Walls, heavy timber, light enclosure. Floors, wood. Roof, wood and slate. Cause, explosion of gasoline while man was washing parts in it. Fire started near a furnace, at about 3 p. m. Alarm, telephone. Duration, 2 hours. Stopped at adjoining building, which was brick. Fire was favored by construction of building, as it had formerly been a storage shed and had been enclosed. Private fire apparatus, 3-gallon extinguisher. Persons in building, 3. Killed, none. Injured, none. Means of escape, door. Value of building and contents estimated at $30,000. Property loss, unknown.

DWELLINGS, PALATIAL

December 1, 1919. Nashville, Tenn. T. Sudekum. Four miles from Nashville on Granny White pike. Dwelling. One 2-story and basement building destroyed. Walls, brick. Floors, wood. Roofs, composition. Cause, supposed acetylene lighting system. Fire started in basement. Discovered by occupants at about 12:30 a. m. Alarm, telephone. Duration, until building was totally destroyed. Fire was favored by wood parts of building. Firemen handicapped by lack of water. Private fire apparatus, none. Persons in building, 10. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $69,641. The chief of the Nashville department reports to SAFETY ENGINEERING: "Although the fire was several miles beyond the city limits, the department responded with two pieces of motor apparatus, but could be of no service except to save the outhouses."

APARTMENT HOUSES

February 6, 1920. Detroit, Mich. Apartment house at 303-305 Cadillac avenue (corner of St. Paul avenue). Unfinished apartment house. One 2-story building destroyed and several damaged. Four, two and a half, and two. Walls, brick, brick veneer. Cause, overheated stove in workshop on first floor. Discovered by workmen at about 11.38 a. m. Alarm, telephone. Duration, four and one-quarter hours. Private fire apparatus, none. Total value of building and contents, $170,685. Property loss, $70,272.

February 3, 1920. Milwaukee, Wis. Auditorium Courts, 830 State street, at Ninth street. Apartment building. One 4-story building damaged. Walls, brick. Floors, wood. Roof, composition. Cause, unknown. Fire started in basement. Discovered by tenants at about 6 p. m. Alarm, tenephone. Duration, about half hour. Confined to building. Fire was retarded by construction of building. Private fire apparatus, none. Persons in building, about 125. Killed, none. Injured, none. Means of escape, fire escapes. Value of building and contents, about $125,000. Property loss, about $3,000.

COPIES OF SAFETY ENGINEERING WANTED

The publishers of SAFETY ENGINEERING will pay $.25 a copy for copies of January, February and March Numbers, 1921, if in good condition.

Circulation Department

SAFETY ENGINEERING

126 Maiden Lane, New York, N. Y.

Materials; Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

OTHER USES FOR "SAFETEE" GLASS

All men interested in the protection of workmen are more or less familiar with the laminated glass which is used in goggles. This glass consisting of two thicknesses of thin clear glass with a sheet of the clearest pyralin beween them. The result is a glass which cannot shatter and yet which retains its perfect transparency free from the tendency to cloud or become obscure under the most trying conditions.

The Safetee Glass Company, 328 No. Broad street, Philadelphia, have issued a circular showing some novel uses for this material, two of which are shown in the illustrations herewith. The first illustration shows a disc of

Fig. 1

"safetee" glass held over a lathe job at the point of operation. This is to prevent the flying of chips in the process of cutting. The other illustration shows a square piece of glass placed between an emery grinding wheel and the operator so as to prevent sparks, chips and dust from injuring a man's eye. There are places where these methods may be preferred to the wearing of goggles and it is in keeping with the progressiveness of the manufacturers of "safetee" glass that they should offer these applications to those desiring them.

Fig. 2

Neither of the devices are particularly new in themselves as safety engineers may be familiar with the use of wire glass in this way but for grinding and machining the mesh of wire glass might obscure vision to a certain extent and in these cases the "safetee" glass would be welcome.

New uses are constantly being found for this glass. We have mentioned in a previous issue the fact that it is bullet proof and this quality has led to its wide adoption by banks for the cages of tellers and other clerks having large sums of money on their desks. Those interested in these protective methods should send for a set of the circulars the company issues.

PROTECTION FOR DOCUMENTS

We are in receipt of two interesting pieces of printed matter from Yawman & Erbe, Rochester, N. Y., one entitled "The Story of the Y. & E. Underwriters' 'B' Label Safe," which shows views of the actual testing of this safe by the Laboratories, explaining the trials through which it went and the condition of the contents at the close of the test. The other booklet is entitled, "Steel Plus Asbestos For Better Protection," and this explains

in detail the construction of the cabinets whereby they resist the trial by fire.

The preservation of files particularly by insurance companies and public record offices is a matter of such exceeding importance that fire protectionists should feel an intimate interest in such products as these.

IPCO INSTANTANEOUS BURN DRESSING

A first aid dressing for serious burns and scalds has been recently placed on the market by the Industrial Products Company of Philadelphia. This consists of a solution of bicarbonate of soda and minerol. A tint of color is added to show the liquid. Three separate rolls of gauze are immersed in this solution and are provided with a little knot at ends, so as to make extraction easy. The entire affected part of a large burn can be quickly covered.

The above illustration shows the patented container in which the dressing is held. You will notice the cover is made so that it can be completely opened in a moment.

The entire solution does not deteriorate or become rancid, and can be kept indefinitely.

The dressing is effective immediately, relieving pain and lessening shock. A bulletin has been issued covering this product.

BLENIO PAINT

Blenio Process Paint possesses many features of importance from a wear standpoint, as well as lighting and sanitary purposes.

While water only is required for the mixing, the resultant paint has a very oily texture, due to the nature of the ingredients incorporated in it. When dry, it oxidizes into a smooth, hard, enamel-like surface that is not only waterproof, fire-retarding and temperature-resisting, but it will not rub, chip or peel off. The resultant surface is hard, durable and lasting, and being strictly a mineral paint, it is unaffected by weather and other destructive elements.

Blenio Process Paint is a particularly good reflector of light, making it especially desirable for all interior painting and decorating. Moreover, it can be washed as often as desired, without affecting it in the least.

For exterior painting also it is very desirable, being particularly adapted to such surface as Concrete, Brick, Hollowtile, Stucco, Wood, Plaster, etc.

In fact it produces the same satisfaction as oil paints, on most kinds of work, and it will outwear any other paint.

Further particulars and samples for testing can be obtained from Blenio Paint Mfg. Co., 334 Fourth Avenue, New York.

"THE FIRE ESCAPE—WHERE?"

An attractive folder has been distributed by the Dow Wire and Iron Works, Inc., of Louisville, Ky., describing the Dow Spiral Slide Fire Escape and showing two recent installations of interest. In the First Artillery Armory, Chicago, these fire escapes have been placed in the battlements thus utilizing what otherwise would have been waste space, and in the new Gibson Hotel, Cincinnati, they are installed without in any way interfering with the architectural effect of the building. Prominent architects have proved that no dangerous speed can be attained by the users of these fire escapes and that when a moderate acceleration is attained it is continuous to the end.

Those interested can secure further particulars by corresponding with the manufacturers.

"OIL OF SALT" BRINGS UNSOLICITED PRAISE

We are advised by the C. A. Mosso Laboratories, 2253 Warren avenue, Chicago, that they have received a voluntary testimonial from the Electric Steel Company, of Chicago, of which they are justly proud.

C. P. Widdicombe, personal supervisor of the above company, writes: "Our accident record for the past year has been completed. Two things stand out very brilliantly: First, we did not have an infection the entire year, which from a viewpoint of having about 400 men in our employ, is very good. Second, our insurance has been reduced from $2.49 per $100 of payroll to $1.50 per $100 of payroll, making quite a saving from that point.

While we do not believe your Oil-of-Salt did all this, will state that it very materially benefited us. We cannot say too much for Oil-of-Salt."

These people have bought "Oil-of-Salt" by the gallon for two years and their enthusiasm is typical of the testimonials received by the manufacturers.

"TRUMBULL METER SERVICE SWITCHES"

We are in receipt of a booklet from the Trumbull Electric Manufacturing Company, Plainville, Conn., bearing the above title and descriptive of "a standardized system of entrance service through meters." This system includes in one unit an externally operated switch, cutout and meter testing connections and encloses the meter terminal chamber and all conductors leading between the switch and meter.

No. 5802, 125 V. without End Wall

No. 5812, 250 V. without End Wall

Box Closed without End Wall

With Meter

The terminal chamber of the meter projects into the box through an open end for top or bottom connections. An end wall is fitted tightly over the terminal chamber of any type of meter used, thus giving a completely enclosed unit with full safety against tampering, theft of current or personal contact.

The switch is operated by a handle on outside of box and can be locked in open position by an attachment inside of box which engages the operating lever.

The cover of box can be sealed with one seal, which protects both meter, switch and main fuses.

When a central station puts a seal upon the box with permission of Public Service Commission they want to rest assured the apparatus covered by seal is not going to give them trouble or embarrassment.

As locking device for switch is inside of box, when box is sealed the switch can be left either unlocked or locked open.

Numerous illustrations explain the installations.

ACME PROJECTOR MOVES

Owing to the ever increasing demand for Acme Projectors, the Acme Motion Picture Projector Company have moved their offices from their plant to 806 West Washington Boulevard, Chicago. This brings the business end of the concern nearer the commercial center of the city and provides more room at the factory for manufacturing purposes.

NEAR-ACCIDENT IN SCHOOLROOM RESULTS IN DEVELOPMENT OF SAFETY-BOARD HOLDER

Some school directors were making a tour of inspection, and while assembled in one of the classrooms a large glass globe on one of the lighting units dropped without the slightest warning and came so near hitting one of the school directors that they, fearful of a like occurrence while children were in the classroom, decided that some method must be provided to prevent similar accidents in the future. The result was the development of the Safety-Board Holder, which is illustrated in the two accompanying views. Figure 2 is a vertical section through this patented holder, and clearly illustrates how the mechanism works. Turning the knurled screw spreads the arms and clamps the globe between the curved shoes, attached to the arms, and the inside of the holder.

The ordinary three or four-screw holder provides only a few points of contact, and unless all screws are carefully adjusted under the lip of the globe, the glass will not hang straight. Unequal stresses are produced by "setting-up" one screw tighter than the others, and when the bowl expands, due to the heat from the lamps, breakage results. The two curved shoes of the Safety-Board Holder extend nearly around the inner surface of the neck and provide a surface contact instead of a point contact as in the case of the ordinary screw holder. Being similar in form and of the same material as the holder, the expansion due to the heating of the holder and shoes is practically the same. Hence, no unequal stresses are produced.

But there are other advantages of the new Safety-Board Holder. Vibration cannot loosen its hold on the glass. When it is desired to remove the glass it is necessary to turn only one screw, instead of several, and the two arms then fall by gravity—hence, the work of taking down and replacing glassware when cleaning is very simple. The person installing the glass can hold it with one hand, and with the other tighten the knurled screw. Even contact and perpendicular suspension are assured, without reaching around the holder or placing one's self in a precarious position on the ladder.

The electrical contractor dealer can buy the complete unit, including chain, canopy, and glassware as shown in Figure 1. He may have it wired, or not wired, and equipped with any glassware that he desires. Manufacturers of chandeliers and glassware may purchase the holder alone and use it in any manner they desire. Just at present it is being manufactured by several companies in the 6-inch size, and those desiring more detailed information and prices should make inquiries through the Beardslee Chandelier Mfg. Co., 216 So. Jefferson street, Chicago, who are responsible for its development and perfection.

FIGURE No. 1

A typical lighting unit which makes use of the new Safety-Board Holder. This holder has several new construction features which facilitate the installation and removal of lighting glassware, and also prevents the glassware from falling when installed.

FIGURE No. 2

A phantom view of the new Safety-Board Holder. Operating the knurled screw on the outside of the holder spreads the two levers within and clamps the glassware between the circular shoes attached to the levers and the inside of the holder.

WESTINGHOUSE SENDS WIRELESS

An interplant wireless communication service was formally opened on May 31 by the Westinghouse Electric & Manufacturing Company, by the establishing of communication between the East Pittsburgh Plant and the Cleveland Foundry. Besides the Cleveland and East Pittsburgh factories, the Springfield, Massachusetts, Works and the Newark, New Jersey, Works are being equipped with stations for the transacting of company business.

The system was formally opened by a message from E. M. Herr, President of the Company, to P. B. Zimmerman, President of the Electrical League of Cleveland.

"The Electric City at the source of the great Ohio River sends greetings to the Cleveland Electrical League. It is fitting that these greetings be sent by radio—the newest method of communication—and that they be transmitted from the plant of the Westinghouse Electric & Manufacturing Company—a company active in the development and production of all kinds of electrical appliances. We congratulate the Cleveland Electrical League on their enterprise and progress in their chosen field and assure them of our hearty cooperation and interest in their activities."

UNDERWRITERS' LABORATORIES

established and maintained by the

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For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

AUTO-STARTERS—Wagner Elec. Mfg. Co., Mfr., 6400 Plymouth Ave., St. Louis, Mo.

CABINETS AND CUT-OUT BOXES—SHEET METAL—Louisiana Metal Cabinet Works, Mfr., 315-17 Burgundy St., New Orleans, La.

CONDUIT BOXES—Appleton Electric Co., Mfr., Wellington and Paulina Sts., Chicago, Ill.

CONDUIT BOXES—Electric Manufacturing & Sales Co., Mfr., 798 Broad St., Newark, N. J.

ELEVATOR CONTROL APPLIANCE—Elevator Supplies Co., Inc., Mfr., 1515 Willow Ave., Hoboken, N. J.

ELEVATOR CONTROL APFLIANCE—Shur-Lee Elevator Safety Co., Inc., Mfr., 420-22 Ogden St., Newark, N. J.

ENCLOSED SWITCHES—Trumbull Electric Mfg. Co., The, Mfr., Plainville, Conn.

FIXTURE—Economical Electric Lamp Division, National Lamp Works of General Electric Co., Mfr., 25 West Broadway, New York, N. Y.

FIXTURE FITTINGS—Appleton Electric Co., Mfr., 1701 Wellington Ave., Chicago, Ill.

FIXTURE SWITCHES—Beaver Machine & Tool Co., Inc., Mfr., 625 North Third St., Newark, N. J.

FIXTURE SWITCHES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

FLEXIBLE TUBING—L. & N. Co., Ltd., Mfr., St. Johns, Quebec, Can.

FRAMES—DOUBLE TYPE—Forderer Cornice Wks., Mfr., cor. Potrero Ave. and 16th St., San Francisco, Cal.

HEATER CORD—Rockbestos Products Corp., Mfr., New Haven, Conn.

LAMPS—ARC—Wohl & Co., M. J., Inc., Mfr., Fayntar Ave. and Hancock St., Long Island City, N. Y.

MEDIUM BASE RECEPTACLES—Armstrong & White, Mfr., Pittsburgh, Pa.

MEDIUM BASE RECEPTACLES—Paiste Co., H. T., Mfr., 32nd and Arch Sts., Philadelphia, Pa.

MOGUL BASE RECEPTACLES—Weber Electric Co., Mfr., Schenectady, N. Y.

OUTSIDE POWER—OPERATED DISCHARGE DEVICE—Clear Vision Pump Co., The, Mfr., 800-830 E. Harry St., Wichita, Kas.

PLASTER BOARD—American Cement Plaster Co., Mfr., 111 W. Washington St., Chicago, Ill.

PLUG FUSES—Metropolitan Electric Mfg. Co., Mfr., Boulevard and 14th St., Long Island City, N. Y.

RECEPTACLES FOR ATTACHMENT PLUGS—Armstrong & White, Mfr., Pittsburgh, Pa.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Machen Electric Mfg. Co., Mfr., 4639-43 E. Thompson St., Philadelphia, Pa.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Benjamin Elec. Mfg. Co., Mfr., 120-128 S. Sangamon St., Chicago, Ill.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Machen Electric Mfg. Co., Mfr., 4639 E. Thompson St., Bridesburg, Philadelphia, Pa.

RESISTANCE APPLIANCES—Cutler-Hammer Mfg. Co., The, Mfr., Milwaukee, Wis.

RESISTANCE APPLIANCES—General Electric Co., Schenectady, N. Y.

SHEET METAL FIRE WINDOW MULLIONS—Lee & Son Co., Thomas, Mfr., 128-32 W. Second St., Cincinnati, O.

SIGNAL APPLIANCES—MISCELLANEOUS—Amrevo Electric Co., Mfr., 2309 Archer Ave., Chicago, Ill.

SIGNAL APPLIANCES—MISCELLANEOUS—Benjamin Elec. Mfg. Co., Mfr., 120-28 S. Sangamon St., Chicago, Ill.

SIGNS—Meyer & Franck, Mfr., 416-18 S. Elizabeth St., Lima, O.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Falstrom Co., Mfr., Monroe & Elm Sts., Passaic, N. J.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Howie Co., Inc., The, Mfr., 5241 Wesson Ave., Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Lee & Son, Thomas, Mfr., 128-32 W. Second St., Cincinnati, O.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Ormsby, C., Mfr., 175 Adelaide St., West, Toronto, Ont., Can.

SLIDING AND SWINGING, SHEET-METAL FIRE WALL DOOR—Reed & Co., Geo., W., Ltd., Mfr., 37 St. Antoine St., Montreal, Can.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Seattle Cornice Works, Mfr., 1730 First Ave., South, Seattle, Wash.

SURFACE SWITCHES—General Electric Co., Mfr., Schenectady, N. Y.

SWEEPING COMPOUND—Kebort & Co., E. T., Mfr., 1407 S. Adams St., Fort Worth, Tex.

SWEEPING COMPOUND—National Chemical Co., Mfr., Dallas, Tex.

SHEET METAL FIRE WINDOW MULLIONS—Walsh Sheet Metal Wks., T. P., Mfr., 1216-22 W. Commerce St., San Antonio, Tex.

SIGN FLASHER—Standard Light Control Co., Mfr., Oakland, Cal.

SLIDING AND SWINGING, SHEET-METAL FIRE WALL DOOR—Atlas Heating & Ventilating Co., Mfr., 72 Freelon St., San Francisco, Cal.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—E. & F. Construction Co., Mfr., 371 Moraine St., Brockton, Mass.

SOLID SECTION METAL FIRE WINDOW FRAMES—Crescent Steel Co., Mfr., 7930 Ivory St., St. Louis, Mo.

SURFACE SNAP SWITCH SUB-BASES—Weber Electric Co., Mfr., Schenectady, N. Y.

SURFACE SWITCHES—Hart Mfg. Co., The, Mfr., Hartford, Conn.

SWINGING, HOLLOW METAL, VERTICAL COMMUNICATION DOOR—Forderer Cornice Wks., Mfr., 269 Potrero Ave., San Francisco, Cal.

SWITCH BOXES—Malden Tool & Machine Co., Mfr., Malden, Mass.

SWITCH BOXES—National Metal Molding Co., Mfr., Fulton Bldg., Fittsburgh, Pa.

TANK GAUGES—Pneumercator Co., Inc., Mfr., 15 Park Row, New York, N. Y.

TEMPERATURE REGULATING SYSTEM—Consolidated Car-Heating Co., Mfr., Albany, N. Y.

UNDERGROUND STORAGE TANKS—Saracco Co., P., Mfr., 526 Bryant St., San Francisco, Cal.

WIRE CONNECTORS—Fahnestock Electric Co., East Ave. and 8th St., Long Island City, N. Y.

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Index to Volume XLII

A

Accident insurance costs, 124
Accident prevention
  Good lighting, 182
  Rubber industry, 254
  Telephone field, 170
  Why should we not prevent accidents? 24
Accidents
  Anaconda Copper Mining Co., 60
  Automobiles, 186, 275
  Car-pushing in mines, 35
  Causes, 24
  Dangerous jobs, 102
  Indiana, 279
  Massachusetts, 37
  Mines, 282
  Paper and pulp mills, 287
  Pennsylvania, 238
  Shipbuilding, 278
  Thrifty employes and, 18
  Wisconsin, 275
Acetylene
  Generator installation, 36
  Wisconsin position, 132
  Acids, safety in transferring, 96
Aeronautics, 135
  Code committee, 193
Air
  Drying as an air conditioning problem, 32
  Dust content, 36
  Washing, 249
Aircraft Register, 123
Aircraft registration, Canada, 185
Alberta, 127
Alcohol, 225
Alkaline soil and concrete, 234
American Abrasive Metals Co., 96
Allen-Robinson Co., 249
American Automatic Connector Co., 291
American Bosch Magneto Co., 125
American City, 80
American Engineering Standards Committee, 264
American Projectoscope, 151
American Public Health Association, 183
  Industrial health, 233
American Smelting & Refining Co., 185
American Society for the Control of Cancer, 275
American Society of Safety Engineers
  December meeting, notice, 283
  Dinner at Boston Congress, 192
  Directors' meeting, notice, 193
  Directors' meeting, report, 239
  Executive Board meeting, Nov. 25, 283
  June meeting, proceedings 39
  Ladder Safety Code, 81, 193
  Membership campaign, 134, 225
  Nominating committee, 193
  November meeting, notice, 239
  October meeting, program, 192
  Publications committee, 135
  September meeting, notice, 135
  September meeting, proceedings, 191
Americanization, safety demands, 273
Amsterdam, safety bulletins exhibit, 246
Anaconda Copper Mining Co., 77
  Accidents few, 60
"Anglmesh" guards, 95
Anthrax
  British disinfecting station, 130
  Brushes as carriers, 187, 279
Arsenous dust, 100
Australia, Safety First Association, 189
Automatic sprinklers, 4
Automobiles
  Accidents, 275
  Accidents in New York, 186
  Hazard in the industry, 230
  Noise regulation, 185
Automotive industry, 187

B

Babcock, F. H., 44, 274
Baldwin, H. S., 128
Batt, Frank, 78
Beyer, D. S.
  Day of the safety engineer, 227
Bezanson, Anna, 228
Blind, remedial education for the, 89
Boilers
  Heating, 232
  Regulation, 38
Bologh skylight ventilator, 38, 97
Booze and safety, 225
Boston
  A. S. S. E. meeting, 284
  Apartment fire, 76
  National Safety Congress exhibit, 33
Brick wall, new, 211
Bridges
  Building to burn, 64
  Saugus River, 64, 128
Brushes
  As anthrax carriers, 187, 279
Bryant, L. T.
  Industrial cripples, care, 217
Building
  Collapse, 129
  Concrete houses, safety, 36
  Construction handbook, 121
  Construction hazard, 79
  Conversion Dangers, 71
  Home building and fire hazards, 158
  Model protective street shed, 63
  Worcester, Mass., code, 33
Building industry accidents, 120
Bullard, E. D., death, 74
  Firm continues, 121
  Los Angeles office, 290
Bulletins, 269
Business depression and fires, 186

C

California Safety Association, 183
Cam machine limit device, 209
Canadian Engineering Standards Association, 262
Canadian National Safety League, 254
Cancer, 188, 275
Carbon monoxide, gas mask for, 51

Carboys, safe handling, 153
Carey, James, 153
Cars, railroad, hose connections, 291
Cement specification, 276
Chairs, 34
Chattanooga, 184
Chemical Exposition, 133
Chemical freeze-proof compound, 291
Chicago fire prevention, 126
  No-Accident Week, 236
  Safety movement, 231
  Sanitation exhibition, 123
  School safety lessons, 128
Children killed in streets, 80
China, reducing street perils, 105
Chlorinating system for tanneries, 272
Chromine, 291
Cigarettes, 177
Civil versus military impairments, 31
Clark, F. V., 135
Clay, Wharton, 80
Cleaning and dyeing regulations, 125
Coal mines
  Fatalities, 130
  Fire prevention and fire fighting, 174
  Hazards and accidents, 236
  Making mining safer, 221
Codes, Safety Engineers', 135
Colburn, C. L., 37
Collapse of building, 129
Colored lights standardized, 126
Common Brick Manufacturers' Association, 212
Compressed air in mines, 123
Compressed air safety code, 192
Concrete
  Alkaline soil and, 234
  Houses, safety, 36
Connecticut fires and smokers, 80
Connelley, C. B.,
  Ladder code essentials, 165
Consolidated Coal Co., 221
Cooley, Dean M. E., 278
Copper mining, 60
Copper smelting, 100
Cottrell, Dr. F. G., 131
Country homes, fire-resistive, 70
Cramps, 118, 179
Cranes
  Limit switch, 249
  Safety devices, 27
Cripples, industrial, 217
Crossing accidents (poster), 274
Crum, F. S., death, 132
Cutler-Hammer Mfg. Co., 49, 209, 291

D

Dangerous jobs, 102
Daniels, J.
  Industrial lighting, 54
Dannenberg, C. O. von
  Safety features on high voltage transmission lines, 15, 74
Davidson, F. A.
  Need of safety code for ladders, 180
Dean, A. W., 219
Decatur, Ga., 128
DeKay & Co., 233
Delaware and Hudson Co., 280
Delaware & Hudson R. R., 14
Dermatosis, printing, 31
Derricks, portable, and power lines, 22
Deuteronomy, 269
Diederichsen, J. A., 35
Diphtheria, 279
Disability fund analysis, 34
Discounting premiums by prevention, 77
Doane, E. E., portrait, 49
Dooley, J. J.
  Common cup and towel, 116
Downey, F. M.
  Telephone accident prevention, 170
Drinking cups, 116
Drinking water fountain, "Practicool," 51
Drying, 32
Dublin, L. I., 253
DuChemin, N. M.
  Education in safety engineering at Lynn General Electric School, 106
Dunlap, L. G., 100-02
Duration Time Study Watch, 95
Dust
  Air dust content analysis, 36
  Electrically precipitated hazards, 131
  Explosive pressures, 37
  Prophylaxis in arsenous, 100
Dutch Safety Museum, 246
Dyeing regulations, 125
Dykeman, H. A., 127

E

Earning power, 253
East Waterway Dock & Warehouse Co., 188
Education, A. S. S. E. committee on, 192
Educational work, 187
Edwards, E. S.
  How a jazz baby stubbed her toe, 45
Edwards, W. D., 290
Electric control board, 248
Electric plants, hazards, 78
Electric switch, 250
Electrical industry
  Hazards, 265
  High tension generating stations, 112
Electrical machinery insurance, 250
Electrical Power Control code, 284
Electrical symbols standard, 128
Electricity
  Fire alarms charged to, 271
  High voltage transmission, 15, 74
Elevators
  Safety device, 210
  Safety in control, 209
  Sidewalk freight, 94
Employes' magazine, 228
Employment Bureau, 122
Employment research, 278
Engineers' Employment Bureau, 122
English language and safety, 278
Erie Railroad Terminal, 213
Europe, Safety movement in, 173
Ex-Odor, 249
Experience Rating Plans, 77
Explosions
  Dust, pressures, 37
  Gasoline tanks, 1, 23
  Heating boiler, 232
  Quarries, premature, 281
  Threshing-machines, 90
Eyes
  Causes of accidents, 146
  Protection, 42

F

Fairmont, W. Va., 221
Fans, Westinghouse-Ventura, 96
Farmers, safety precautions, 75
Fatigue
  Result of seating, 34
  Safety versus, 41
  Safety work and, 167
Feralun, 96
Field hospitals, 201
Films, 19
  See also Motion-pictures
Fire alarm systems, 7
Fire alarms, false, in factories, 125
Fire and Accident Prevention Day, 118
  Pictures by Paramount stars, 157, 169 177, 194
  Observance, 194

Fire extinguishing assessment legislation, 19
Fire Marshals' Association, 121
  Convention at Chattanooga, 184
Fire prevention
  Bituminous coal mines, 174
  Chicago, 126
  Educational work, 19
  Lessons in school, 185
  Ohio exhibit, 127
Fire protection surveys in cities, 126
Fire Stop, 226
Firemen's masks, 123
Fires
  Apartment, Boston, 76
  Business depression and, 186
  Connecticut, 80
  Electricity as cause, 271
  Hampton Beach, N. H., 67
  Human costs, 242
  Oil and distillate tanks, 21
  Oil tanks, 53
  Recent, and their lessons, 46, 91, 147, 204, 247, 288
  Sudden fires and valuable records, 213
  Where dangers are inconsistent, 251
  See also National Fire Protection Association
Fireworks, accidents due to, 66
First-aid, 118, 179
Fisher, F. W., 78
Fisher, Irving, 252
Flexible steel rope inspections, 220
Foreign-born
  Public health and, 65
  Safety and, 273
Foremen
  Responsibility, 88, 243
  Safety, graduation, 234
Foundries
  New code, 135
  Safety code, 33
Fourth of July, 66
Frankel, L. K., 33
Freitag, J. K., 233

G

Garages
  Floor hazard, 126
  Owner's responsibility, 71
Gas mask for carbon monoxide, 51
Gas plants
  Employes' safety, 78
  Hazards, 78
Gasoline
  Household cleansing hazard, 157
  McNutt can, 291
  Safety washstand, 125
  Storage tank hazards, 1, 23
Gasser, C. A.
  Electricity and "electricity," 271
General Electric Co.
  Lynn, education in safety, 106
  Lynn, bridge rebuilding, 128
Generators, 112
Gilbreth, F. B., and L. M.
  Fatigue study and safety work, 167
Glauber Brass Mfg. Co., 51, 153
Goggles, Comfort, 152
Goodspeed, M. C., 284
Gorter, R. A., 246
Gould, R. L., 135
Government safety work, 10
Grade crossings (poster), 274
Grant, B. M.
  Thrifty employes and accidents, 18
Gratings, 151
Graves, W. J., 286
Gray, C. D., 114, 193
Green flag, 130
Greene, A. M., Jr., 122
Guards, 154
  Materials, 291
Gwillim, S. S., 89

H

Hadley Rescue Mission, 129
Hahman, William, 222
Hampton Beach, N. H., fire, 67
Hand labor accidents, 185
Hapgood, Powers, 35
Harrington, D., 124
Harrisburg Industrial Conference, 178
  Exhibitors (group), 277
  Proceedings, 241
  Views of aisles, 292
Hartford-Connecticut Trust Co., 63
Harty, Harold, 77
Hazards
  Automobile industry, 230
  Diagnosis of hazardous occupations, 259
  Electrical, 265
  Industrial, and insurance companies, 229
Head and Eye Code, 135
Headlighting devices, 75
Health, 45
  Common drinking cup and towel, 116
  Industrial, in American Public Health Association, 233
  Industrial service, 30
  Legislation, 78
  National organizations, 188
  Ohio experiment, 185
  Public health and the foreign-born, 65
Health First Fortnight, 183
Health Institute and Exposition, 183
Hendrickson, F. K., 187
Heyne, H. P., 139, 202
Highways. *See* Roads
Holmes Safety Association, 122
Holt, Winifred, 89
Holt Mfg. Co., 238
Holtzer-Cabot Electric Co., 248
Home movies, 275
Hospitals
  Field, value, 201
  New York downtown, 183
Houses
  Country, fire-resistive, 70
  Fire-safe wooden, 80
Hubbard, S. D.
  Accident prevention, 24
Human life, value, 252
Hutchinson, Rivinus & Co., 71
Hyde, D. W., Jr., 268

I

Identification tag, new, 224
Illinois Steel Co., 277
Illumination. *See* Lighting
Immigrants, health, 65
Indiana, industrial accidents, 279
Industrial cripples, 217
Industrial Digest, 235
Industrial Engineers, notice, 133
Industrial medicine, 131
Industrial nursing, 276
Industrial Relations Association, 133
  Convention date, 183
Industrial Relations Conference at Harrisburg. *See* Pennsylvania Industrial Relations Conference
Industrial standardization, 264
Industry
  Health service, 30
"Inland Empire," 277
Inspections, 87
  Outside-the-plant, 126
  Purposes and results, 214
Inspectors' duties, 260
Insurance companies
  Inspection work, 214
  Reduction of hazards, 229
  Tuberculosis and, 279
International Association of Fire Engineers, 121
International Labor Office, 263

J

Janvrin Hotel ruins, 67
Johnson, T. F., Jr., 17, 74
Joseph, J. F., 242

K

Kentucky mine fatalities, 34
King, W. F., 252
Kingsbury, C. A., 36, 152

L

Ladders
A. S. S. E. code, 193
Essentials of national code, 165
Need of a safety code, 180
Safety code, 81
Lead mines, 184
Lee, Lila, 157
Libraries, safety, 268
Life, value to society, 252
Lighting
Accident prevention by, 182
Code, 135
Importance, 58
Industrial, 54
Industrial, efficient equipment, 70
Lightning, fires from, 74
Lime Association, 184
Limestone quarries, 186
Linden, N. J., oil fire, 53
Lipscomb, W. N., 202
Lissauer, A. O., 32
Literature, survey of safety, 268
Long Beach, Cal., 232
Los Angeles, 169
Bullard firm, 290
Louisiana law for small caliber rifles, 79
Lynn, Mass., 64, 128
General Electric school, 106
Lytle Coal Co., 185

M

Macdonald, G. C.
Report of N. F. P. A. conference, 2
McNutt gasoline container, 291
Macon, Ga., 251
Magazines, employes', 228
Magnetic clutch, 49
Man On The Job
Articles and offer, 41, 87, 136, 199, 243 285
Comments, 89, 139, 245, 286
Prizes won, 89, 139, 202, 245, 286
Man-on-the-street story, 179
Management Engineering, 79
Man's cash value to society, 252
Marathon Paper Mills, 77
Marble quarries, 127
Marine hazards, 6
Marshall, Lloyd
Seeing ahead with the N. F. P. A., 19
Maryland, health experiment, 78
Maryland Casualty Co., 249
Massachusetts
Accidents, 37
Uniform road warnings, 219
Matches, 177
Not toys, 169
Prose poem, 281
White phosphorus, 133
Metal smokestacks, 71
Metcalf, W. B., 279
Meteorite as cause of fire, 75
Metropolitan Life Insurance Co., 253, 259, 279
Meyer, A. L., 36
Military impairments, 31
Mills, C. M., 34
Milwaukee, school without an accident, 35
Mind versus safety, 137
Mine rescue station, bill for Terre Haute, 129
Mine rescue work, 76
Mine Safety Appliances Co., 51
Miners' first-aid contest, 185
Mines
Accidents, 282
Car-pushing causes accidents, 35
Compressed air, 123
Fatalities, 237
Fatalities fewer, 76
Kentucky, 34
Risks, November to May, 237
South Africa, reduction of accidents (poster), 86
Telephones, 127
See also Coal mines
Motion pictures
Fire and Accident Prevention Day, 157, 169, 177, 194
Home, 275
In lodges, etc., 75
Matches not toys, 169

N

National Electric Light Association
Report of Lighting Sales Bureau, 54
National Fire Protection Association
Educational activities, 19
San Francisco (25th) conference, 2
National Founders Association, 152
National health organizations, 188
National Safety Council, 118, 179
See also Safety Congress
National vitality, report on, 252
Nervousness, 138
New men, 77 t
New South Wales, 189
New York City
Downtown hospital, 183
Fatal staircase, 270
Harbor oil pollution, 129
Health Institute, etc., 183
Newark, N. J., 271
Norfolk & Western R. R., 275
Norwich Wire Works, 291
Nursing, industrial, 276

O

Oakes, C. E. *See* Rosa, E. B., and C. E. Oakes.
Obey the Law or Pay the Price (poster), 274
"Occupation Hazards and Diagnostic Signs," 259
Occupational poisoning, 263
Office safety display, 276
Ohio
Fire prevention exhibit, 127
Health experiment, 185
Labor urges safety campaign, 234
Oil, floating on rivers, 281
Oil plant fires, 21
Oil tank fires, 53
Oiler unprofitable, 235
Ontario Fire Prevention League, 278
Ontario Pulp and Paper Makers' Association, 40
Oregon
Compensation law, 123
Teaching safety in schools, 35
Orr Machine Guarding Co., 95

P

Pacific Coast, 129
Pacific Gas & Electric Co., 22, 34
Page, F. A., 38
Paint
Accidents reduced by, 59
Choice of, 58
Poisonous, 263

Paper industry
Accidents in mills, 287
Accidents reduced, 77
Pawling & Harnischfeger Co., 129
Pefferly, W. J.
Electrical hazards more dangerous than mechanical, 265
Pennsylvania
Car-pushing in mines, 35
Industrial accidents, 238
Industrial Relations Conference, 33, 73, 178, 198, 212, 241, 277, 292
Motion pictures in lodges, etc., 75
Strikes in 1920, 79
Peoria, 238
Personal responsibility, 71
Personnel research exchange, 37
Petroleum industry, loading racks, 80
Philadelphia, discounting premiums by prevention, 77
Phosphorus, white, 133
Physical examination, 45
Pier level areas, 6
Pittsburgh, safety foremen graduation, 234
Pittsfield, Mass., 237
Pneumonia, 279
Poetry. *See* Verse
Poisons, occupational, 263
Poole, H. S.
Accident prevention in the rubber industry, 254
Portable derricks and power lines, 22
Porter, F. P., 233
Portland cement, specifying, 276
Post Office welfare service, 33
Posters, art of, 269
Power, F. Danvers, 189
"Practicool" Drinking Fountain, 51
Prakken, Nicholas
Crane safety devices, 27
Price, C. W., 234
Princeton University, Engineering, 122
Printing dermatosis, 31
Public assemblies, motion pictures in, 75
Pulley belt (cartoon), 41
Pulp mills, accidents, 287
Punch presses, 61
Pyrene Mfg. Co., 49, 96, 291

Q

Quarries,
Accidents, 76
Limestone, 186
Marble, 127
Premature explosions, 281

R

Railroads
Casualties per locomotive mile, 14
Fatalities reduced, 275
Hose connections for cars, 291
Railway Fire Protective Association, 121
Rasmussen, W. R., 234
Rating credits, 136
Records, fires and, 213
Red Cross, industrial work, 176
Redmond, F. E., 280
Reed, J. W.
Mine fire prevention, 174
Refrigerating plants, 127
Reid, A. C.
Eye mightier than the hand, 58
Reiley, A. D., 229
Retrenchment, 199
Revere, Mass., 64, 128
Rifles, small caliber, 79
Roads
Safety on, 275
Uniform warnings in Massachusetts, 219
Rochester, N. Y., Gas & Electric Co., 78
Rosa, E. B., and C. E. Oakes
Safety work of the Federal Government, 10
Rotary Clubs, 238
Rothschild, Wis., 77
Rubber industry, accident prevention in, 254

S

Safety
Educational work, 187
Mind versus, 137
Retrenchment versus, 199
Safety-ism and junk (cartoon), 44
State codes, 119
Suggestions in verse, 286
Teaching in schools, 188
Safety codes, States having, 69
Safety Congress, Boston
No exhibit, 121
Notes, 195
Program, 99, 141
Safety engineer, 227
Safety engineering, proposed textbook, 284
Safety equipment
Exhibitors (group), 277
Safety exhibits, views of aisles, 292
Safety First, Australian Association, 189
Safety guards, 154
"Safety in Building Construction," 121
Safety inspection, 260.
Safety literature, 268
Safety movement, origin, 173, 269
Safety museum, Dutch, 246
Safety news and comment, 33, 73, 121, 183, 233, 275
Safety organizations, activity in "Inland Empire," 277
Safety-poster art, 269
Safety "razz" and "jazz," 285
Safety-trip for punch presses, 61
Safety work
Government, 10
Relaxation, 23
Yard engines, 280
St. Stanislaus College, 251
Salamanders, 188
Salt Lake City
Gasoline tank explosion, 1, 23
Water supply protection, 62
Samuels, M. M., 193
High tension generating stations, 112
San Francisco, N. F. P. A. conference, 2
San Francisco Bay, 131
Sandusky, 185
Sanford, G. E., 119
Safety movement dates from Deuteronomy, 269
States having safety statutes or codes, 69
Sanitation, Chicago exhibition, 123
Saugus River Bridge, 64, 128
Savings, 18
Saws, accidents from, 140
Schlesinger's Safety Interlock System, 210
Schoolhouses, Milwaukee building without an accident, 35
Schools
Oregon, teaching safety, 35
Safety lessons, 128
Teaching safety, 188
Scott, D. J., 225, 269
Scott, R. J., 169
Sea safety rules, 78
Seating and fatigue, 34
Seattle, Wash., 188
Shafer, Harrington, 139
Shanghai, 105
Shaw, J. G.
What the safety inspector must do and what he has done, 260
Shelbyville, Ind., 186
Shingles, value of spark-resistive, 67
Shipbuilding, accidents, 278
Shur-Lock Elevator Safety Co., 94
Sidewalk freight elevators, 94
Sidewalk protective shed, 63
Signs, steel, prices, 152

Silberberg, M. J., 95
Siren as fire alarm, 248
Slate quarry accidents, 76
Smelting, 131
Smoking, 80
Smokestacks, metal, 71
Soulé, A. M., Jr., 245, 286
South Africa, reducing mine accidents 86 (poster), 269
Special libraries directory, 268
Spence, P. C, 184
Sperry Gyroscope Co., 124
Stairs, fatal, in New York tenement, 270
Standard comfort window, 290
Standard Safety Equipment Co., 36, 152
Standard Stamping Co., 61
Standardization, industrial, 263
Standards
  Electrical symbols, 128
  Highways, lights, 126
States' safety codes, 119
Statistics, 244
Steel rope inspections, 220
Steelcrete Expanded Metal, 154
"Sterling" electric siren, 248
Stonehouse Steel Sign Co., 152
Storage battery locomotives, 235
Stowell, L. M.
  Safety demands Americanization, 273
Street shed, model, 63
Streets
  Children killed, 80
  China, reducing perils, 105
Strikes in Pennsylvania in 1920, 79
Super-Safety Electric Co., 250
Sydney, N. S. W., 189
Syracuse
  Safety meetings, 183
  Safety results, 80

T

Tanneries, chlorinating system for, 272
Tarbell, Ida M.
  Mobilize women for safety, 203
Telephone pole, first aid, 34
Telephones
  Accident prevention, 170
  Mines, 127
Tenement house fire and staircase, 270
Terre Haute, 129
Textbook, proposed, on safety engineering, 284
Threshing machine explosions, 90
Thrift and accidents, 18
Tillinghast, Gardner
  Paint as an accident reducer, 59
Tire vulcanizers, 127
Tobey, J. A.
  Dangerous jobs, 102
Tools, hand or bench, 117
Towels, 116
Traffic Safety Exposition, 133
Tuberculosis and life insurance, 279
Tulsa, Okla., fire limits, 37
Typhoid, 279, 280

U

Underhill, A. M., 89, 139, 245
Underwriters' Laboratories, devices listed, 52, 97, 155
U. S. Bureau of Mines, 221, 236
Universal Safety Tread Co., 151
Utah Oil & Refining Co., 1, 23
Utica Mutual Insurance Co., 125
Utility Safety Appliance Corporation, 210

V

Valves, boiler and steam lines, 153
Veiligheidsmuseum, Amsterdam, 246
Venning, W. J.
  Inspection work, purposes and results, 214
Ventilation
  Artificial, 5
  Experiments, 237
Verse
  Free verse for safety, 238
  Safety (Diederichsen), 35
  Suggestions, 286
  Who's next to go? 285
Vitality, national, 252
Voigtlander, W., 220

W

Waldo, R. J., 128
Warner-Quinlan Asphalt Co., 53
Washington (State)
  Associated Safety Engineers of Western, 238
  Compulsory safety, 127
Waste baskets, 177
Waste in industry, 73, 218
  Building, 120
Watchmen, 130
Water supply, signal system for protection, 62
Weehawken, N. J., 213
Wells, W. M.
  Criticism of "Fire Stop," 226
West Virginia, mine risks, 237
Westinghouse Electric & Mfg. Co., 249
Westinghouse-Ventura Fans, 96
White lead, fight against, 263
White phosphorus, 133
Wildoner, C. E.
  Safety-trip for punch presses, 61
Wilkinson, F. A., 202
Wilmington, Del., 236
Windows, safe, 290
Wisconsin
  Acetylene position, 132
  Industrial accidents, 275
  Industrial commission on lightning, 74
Woltz, J. M.
  Letter on Scott of Ohio, 269
Women, mobilize for safety, 203
Women's clubs and fire prevention, 20
Wood-working industries, 128
Wooden houses, fire-safe, 80
Woodruff, C. N., 89
Worcester, Mass., Building Code, 33
Worthington, C. E.
  Home building and fire hazards, 158
  On metal smokestacks, 71, 72

Y

Yard engines, 280
Young, A. H., 231
  Man-on-the-street story, 179
Youngstown Sheet & Tube Co., 280

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Vol. 42 JULY, 1921 No. 1

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Photo by Underwood & Underwood.

At Salt Lake City, on June 12, fifteen persons were killed and property valued at more than $1,000,000 was destroyed, in the plant of the Utah Oil & Refining Company. Lightning struck a huge tank of gasoline distillate. Several lives were lost when the tank shown in the foreground exploded. See "Hazardous Location of Gasoline Storage Tanks," page 23.

National Fire Protection Meeting

Digest of Sessions—25th Annual Conference San Francisco, June 14-16, 1921

Special Report for Safety Engineering, by Guy C. Macdonald

FIRST DAY

THE silver anniversary meeting of the National Fire Protection Association opened in the Fairmont Hotel, San Francisco, June 14, as scheduled, with a large representative attendance. Immediately after roll call President W. E. Mallalieu read his annual address, in which he reviewed the activities of the organization during the past year, mentioning briefly the enormous fire waste of 1920 over the previous years and comparing it with the conflagrations of San Francisco and other cities. He stated that statistics for 1920 show that the fire waste of the United States was considerably over $500,000,000. He paid a tribute to Secretary Franklin H. Wentworth and others who have devoted a great portion of their time and effort to forwarding the aims and ambitions of the Association.

WELCOME BY JAY W. STEVENS

Jay W. Stevens of San Francisco, who was in attendance with the aid of a cane after a serious automobile accident over eight weeks ago, moved the acceptance of the President's address with a short talk to the delegates on the work of the President himself, and also took advantage of the opportunity of welcoming the members to San Francisco for the occasion. C. J. Holman, president of the California Insurance Company and Pacific Coast manager of the Commercial Union Fire Insurance Company, seconded Mr. Stevens' motion in a brief address.

Secretary Wentworth announced the following as the Committee on Resolutions: W. C. Robertson, chairman, J. F. Healy, J. Hoagland, A. M. Schoen, R. S. Malone, R. J. Cantrell.

H. L. Minor of Wilmington, Delaware, in the absence of Rudolph P. Miller, chairman of the Executive Committee, read the report of that committee. Following the acceptance of the report a motion was carried to extend to Mr. Miller the regrets of the association for his unavoidable absence, and to thank him for the able work his committee has done during the past for the good of the organization.

RESOLUTIONS ADOPTED

The report of the Resolutions Committee was read by R. S. Malone of New Orleans. The resolutions, with one or two minor changes, were substantially the same as those which have been adopted in past years and touched the following subjects:

1. Advocating the adoption by municipalities of the Standard Building Code of the National Fire Protection Association.

2. The adoption by States and municipalities of the building code for schools, hospitals and kindred structures.

3. The adoption and enforcement of the fire marshal law.

4. The adoption of the Association's ordinance providing for systematic inspection by local fire marshals.

5. The enactment of laws fixing personal liability for fires.

6. The adoption and more general use of the automatic sprinkler and other devices for the prevention of fire and the protection of life.

7. The technical survey of cities, including and paying particular attention to water supplies, fire department efficiency, more rigid attention to various hazards,

and co-operation of all public officials in this work.

8. The adoption of the safety match and the regulation of smoking in factories.

9. The education of children in the public schools and the adoption by schools of the Fire Prevention Manual.

10. The advocacy of State and municipal laws regulating the moving picture business display.

11. The regulation of fireworks displays by public officials, preferably the superior of the local fire department.

12. The co-ordination of all these activities.

These resolutions were referred to the Resolutions Committee for further consideration to be reported back to the meeting at the last session of the convention. Wires were then sent to former presidents and honorary members of the Association, including a wire of condolence on the death of Mr. Stoney. Wires were read from W. F. Healy of the Railway Fire Protection Association, Willis O. Robb and Robert Scott. A resolution was adopted calling for a memorial on and full consideration by the Executive Committee of the subject of oil in harbors.

Franklin H. Wentworth in his report as secretary called particular attention to the stability of the membership during the past few years of disturbance and more particularly to the past few months of distress to many of the members.

AMENDMENTS TO ARTICLES OF ASSOCIATION

The committee report on amendments to the Articles of Association was read by A. O. Boniface of New York in place of Robert D. Kohn. The most important amendment was that submitted by the San Francisco Chapter, which called for the creation of an auxiliary membership which would allow the local chapters to solicit memberships from the general public at the rate of $1 per year, the National Association to send to these members various copies of such works as would aid in the dissemination of fire prevention propaganda. Opposition to this measure arose, but after some discussion it was carried, the amount of the annual dues being changed to $2, the local chapters to care for all bookkeeping, etc., and the auxiliary members to have a vote in their local chapter but no further affiliation with the national organization; the Executive Committee is to decide what literature should be sent to these members.

Jay W. Stevens, chief of the Fire Prevention Bureau of the National Board of Fire Underwriters, and founder of the San Francisco Fire Prevention Bureau, whose work in educating the public in fire prevention has attracted national attention, spoke on behalf of the San Francisco amendment. He stated that the Association would be presented with an extraordinary opportunity through the medium of the auxiliary membership to reach the people in large numbers, a feature of the movement which has been one of the most puzzling problems with which the Association has had to contend for many years past. He further stated that in San Francisco he felt that with the auxiliary membership brought up to 5,000 it would be quickly realized by public officials that the sentiment of the majority of the people was in favor of better fire protection and better fire prevention methods. In his work, he said, it was only by showing to the officials in charge of the various city and State governments that the public was interested, that he has succeeded as far as he has. A. M. Schoen of Atlanta, Ga., seconded Mr. Stevens' sentiment and further stated that his experience in various public work has demonstrated to him that such a membership and such methods would work out in the manner in which Mr. Stevens contended. The amendment, as amended, was then carried.

The other amendment which came before the assemblage was the changing of the date of the annual meeting. This amendment carried without discussion; hereafter the annual meeting will be held preferably in May at a date to be set either by the Association as a whole at its annual meeting or later by the Executive Committee.

Gorham Dana of Boston read the report of the Membership Committee. He urged in this report that each member of

the organization solicit ten names for membership immediately on his return home, with the view of each member's obtaining at least two new members during the coming year.

Franklin H. Wentworth read the report of the Public Information Committee in which he outlined the general activities of the Association in the dissemination of various kinds of fire prevention information and the media used by his office.

George M. Muldaur of New York, a sub-committee of one specializing on the adoption of laws and ordinances defining personal liability for fires for the Public Information Committee, gave a comprehensive outline of the situation in the eastern States where he had made efforts to create popular sentiment in favor of such action. He stated that with the exception of one or two public bodies he had succeeded in obtaining at least favorable comment and that his work had received such encouragement from various cities and State governmental officials that he advocated a continuance of the fight until it became a generally recognized law throughout the entire country. It was further brought out that the principal opponents of such measures are usually the real estate men of the community. The short discussion which followed was all toward the end of favoring a continued drive of education along these lines.

Other delegates called attention of the conference to the need of other legislation that would regulate smoking in factories and stores.

T. Alfred Fleming, chairman of the Fire Prevention Day Committee, gave a most interesting review of the activities during 1920 in behalf of a more general observance of Fire Prevention Day. He commented upon the whole-hearted support he received from the Federal and State governments. Mr. Fleming was given quite an ovation when he completed his reading and many of the delegates took advantage of the opportunity to add their endorsement to his work.

A review of the organization and activities of San Francisco Chapter was given at the request of the chair by R. J. Cantrell, of the Pacific Gas & Electric Company. Mr. Cantrell gave all credit for the San Francisco Chapter to Jay W. Stevens, who, he said, had single-handed enlisted one hundred representative men of the city as his nucleus for the new body. How the body became a prominent factor in the city's fire protection efforts, and the final enactment and enforcement of a fire prevention bureau within the local fire department over the opposition that had existed for years past, was mentioned as further evidence that the public officials will act when they realize that public sentiment and understanding have been aroused.

One of the most interesting reports of the meeting was that of the Canadian Committee, read by F. F. Dowling of Vancouver. The work of the Canadian Committee showed that considerable progress had been made. Mr. Wentworth took the opportunity to pay a high tribute to the ability and efforts of G. H. Greenfield of Montreal, chairman of this committee.

Mr. Wentworth then read the report of the Laws and Ordinances Committee, calling attention to several ordinances which the Association desired as a guide to States and municipalities. Discussion arose of the clearness of the phraseology of the suggested laws; it was explained that these laws were recommended to the Association only as suggestions to guide various public bodies in formulating local ordinances. In order that there should be no further misunderstanding it was the consensus of the meeting that the report be referred back to the committee for the purpose of reconciling the differences brought up in the discussion so that there would be a clear-cut and definite understanding as to the requirements of industrial plants in contrast with those set as standards for the average household.

AUTOMATIC SPRINKLERS

E. P. Boone of New York read the report of the Committee on Automatic Sprinklers. This report was adopted with a slight change in wording which would allow a little more leeway in the matter of capacity, it having been suggested that 1,000 gallons may not be sufficient in some cases; therefore the word-

ing of the rule was changed so that more than 1,000 gallons can be allowed where necessary. It was further brought out that special roof construction would need specific treatment rather than a stipulated rule which would probably cause misunderstanding by some owners and builders. It was also held that a test alarm should be installed on a dry pipe valve for the purpose of determining the efficiency and integrity of the system.

Considerable discussion over various recommendations arose during the reading of the report of the Committee on Manufacturing Risks and Special Hazards by Assistant Secretary R. S. Moulton. In a long introduction to the report, which was submitted in two sections, Mr. Moulton announced the intention of the committee to issue a new booklet on the rubber industry, with special reference to dip tanks. Foam fire extinguishers were stated to be efficient for such classes of fires. In submitting a new set of rules and requirements objections were debated somewhat.

ARTIFICIAL VENTILATION BETTER THAN NATURAL

In the matter of ventilation H. L. Minor of Wilmington stated his experience as proving mechanical and artificial means of ventilation more efficient than natural ventilation, especially where the air was full of the fumes of ether and other such gases. He also took objection to the method of presenting the suggested rules, stating that the efficacy of the Association would be lost somewhat if owners and manufacturers were made antagonistic by the presentation of such rules and regulations as were being submitted to the convention. He requested that the committee devote itself to some practical manner of aiding the manufacturers in improving their plants. In the matter of dip tanks, the suggested rules, he said, would prove a distinct hardship to the small factory owner; it was his opinion that the committee had devoted most of its attention to the bigger factories where more and larger dip tanks are used.

It was also suggested that wherever automatic sprinklers were mentioned in the tentative rules and requirements that the word "standard" be inserted as at the present time systems that are not considered standard are becoming more and more frequent.

The committee report was adopted with the recommendation that it be but tentative until all members have the opportunity to digest it further, and that before being printed in pamphlet form for final distribution, six months be allowed for changes and revision.

As this committee had failed to comply with one of the requirements of the Articles of Association as to attaching to their reports the standing of the members of the committee in the final voting on the report, it was necessary to suspend the rules in order that the reports could be further considered.

Electric conveyors in automobile factories, over the dip tanks, were shown to be a distinct fire hazard which needed immediate attention. The recent fires in large factories were laid to this cause. As many of the dip tanks in such institutions are larger than heretofore and outgrowing the capacity of the sprinkler systems, it was deemed necessary that something be done to cope with this new situation.

Other discussions were confined to making all the rules comprehensive and free of ambiguity so that the average owner and manufacturer could clearly understand them, so as to secure their general adoption when approved.

SECOND DAY

The report of the Committee on Field Practice was read by F. J. T. Stewart of New York in place of Edward R. Hardy, who was unable to attend the meeting. The report was adopted substantially as printed, with a suggestion that the committee give further consideration to the matter of area.

This report was followed by that of the Safety to Life Committee, which was read section by section by C. Heller of San Francisco, substituting for H. W. Forster of Philadelphia. This report was adopted without any particular discussion.

Charles H. Fischer, chairman of the

Committee on Docks, Piers and Wharves, read the report for that body and interspersed remarks from time to time outlining the committee's ideas on certain phases of the work.

LIMITING PIER LEVEL AREAS

The principal question which Mr. Fischer stated the committee considered without coming to any definite conclusion was that of limiting areas in piers and wharves. He stated that it was impossible to set down any definite level area owing to changing conditions as well as the various characters of the different uses to which the piers were subjected. The committee considered further the installation of fire walls at certain intervals, approximately at 200 feet where the width of the pier was over 150 feet and the length was over 1,000 feet. He further brought out that at the present time there is a tendency to widen piers to meet changing conditions and that now the tendency is to build piers of from 400 to 500 feet in width. He also brought out that the committee was firmly of the opinion that the best fire resistant material to be used in the construction of piers and wharves is concrete. It was suggested by another delegate that where concrete firewalls were to be installed, they be built independent; another urged that, with all the committee's recommendations for fire resistant material in the building of the structure, the specifications for firewalls be modified. In response to this suggestion it was stated by the committee that the large area which the firewall could cover justified the thickness specified in the report. The burden of the report was the recommendation that automatic sprinklers become a standard equipment on all docks, piers and wharves.

The discussion was principally centered upon a modification of the firewalls and upon a better understanding of the installation of automatic sprinklers so that they would serve the purpose to the height of efficiency. It was suggested that the sprinkler heads be closer together, and 65 feet was cited as being infinitely better than 80 feet. Mr. Fischer stated that the committee expects to harmonize the requirements for hand appliances so that they will conform with those recommended by the Committee on Field Practice, and in addition will soon publish an analysis of the treatment of fire hazards incident to the operation of pier properties. The recommendation that stocks be piled on wharves at least two feet from all walls brought up the question as to whether or not this could be enforced. Mr. Weber of Portland, Ore., stated that he found that on the Pacific Coast owners were conforming with this suggestion at this time and found it economical and proper. The report of the committee was adopted as read, with the understanding that some of the suggestions would be given further consideration before being printed for final distribution.

MARINE HAZARDS

R. S. Moulton, assistant secretary of the Association, read the report of the Committee on Marine Hazards. Mr. Moulton in introduction stated that this committee had met such considerable prejudice and lack of co-operation from some sources that the committee had not attempted to make this report final in any way, but would continue its work until next year, when he anticipated that the preliminary work would be completed and all approached would lend their active support to the efforts and desires of the Association to help in the matter of preventing fires and conserving property. He further stated that active co-operation was given by the United States Steamboat Inspection Service, the Shipping Board and Lloyds. Criticisms from the Standard Oil Company and some other corporations, he stated, had been received since the issuance of this preliminary report; all of these will be given future consideration by the committee.

It was urged by delegates that, if the final report of this committee is to become official in character, it be understood that the steamboat people must be free from having to comply with more than one set of standards. Suggestion was made from the floor that an article be inserted in the report to permit the use of steam systems in steamboats, and gas systems, notably the Rice system, in motorboats. In addition it was suggested

that these systems be equipped with automatic appliances for the detection of incipient fires, and that alarms be centralized in one section of the boat rather than at different points. It was further suggested that instead of considering or calling for the handling of smoke and gases that some method be recommended by the committee which would result in the drawing or sucking out of smoke and gases from the ship. It was suggested that the committee give further consideration to the matter of pumps on vessels, taking cognizance of the size, location and equipment. It was pointed out here that there was considerable confusion in this respect and that many vessels are improperly equipped.

C. W. Mitchell of San Francisco read a short report of the Electrical Committee; this was unanimously adopted.

CABLE FOR UNDERGROUND ALARM SYSTEMS

F. E. Cabot of Boston read the report of the Committee on Signaling Systems and considerable discussion ensued regarding the size of cable for underground fire alarm systems. While the report recommended 18, the Pacific Coast delegates were of the opinion that 16 would serve the purpose as well if not better. Mr. Weber of Portland, Oregon, asked that the committee incorporate in their report a recommendation that conduit systems be used for all new work; Mr. Cabot stated that at the present time the committee found it impossible to make such a recommendation, although it was in favor of such work and would work to the end that eventually all systems would be conduit. Comment on this report was received from the Electrical Inspectors. It was moved, in the absence of suggestions, that further discussion of the question be taken up by letter.

At noon the delegates were the guests of the San Francisco Chapter at a record luncheon, stated to be the largest and most successful ever attended by the National Association. Addresses were made by W. E. Mallalieu, Jay W. Stevens, Franklin H. Wentworth, Chief T. R. Murphy of the San Francisco Fire Department and A. L. Betz of Ohio.

Following the luncheon a demonstration was given the delegates of the high pressure system of San Francisco by the fire department, and the delegates were taken for a tour of special points of interest for the balance of the afternoon.

THIRD DAY

Ira H. Woolson of New York, chairman of the Committee on Building Construction, read the report of that committee, and general discussion followed. In regard to the thickness of walls in a building of Grade E construction for office occupancy, differences of opinion existed regarding the requirements for a wall of rubble-stone construction. It was suggested that solid stone was acceptable construction and that in finally adopting the regulations the word "rubble" be stricken from the wording so that the regulation may apply to walls constructed of any kind of stone. Protests were made against the adoption of the paragraph relating to allowable loads on walls, it being contended that such a regulation was not necessary in the report. Professor Woolson stated that this question appeared to be largely of an engineering character. In the matter of piers it was suggested that the word "cement" be changed to "concrete" as being more definite and comprehensive. Regarding interior columns in such a building protests had been registered by the U. S. Bureau of Standards against the stipulation that they be subjected to a two-hour test. Authorities present reported results of such tests and after some general discussion it was the consensus of opinion that a test of one hour would be sufficient. This recommendation was referred to the committee for further consideration. Owing to conflict in the paragraphs relating to interior partitions and columns it was decided that before the report was adopted the words "and columns" should be stricken from the report, as the paragraph did not touch on this matter.

Considerable discussion came up about the matter of joining and plastering interior partitions; it was brought out that the use of metal lath did not necessarily

insure against the cracking of the juncture of the wall and ceiling, and further it was questioned as to whether or not cracking had any effect upon the matter of fire prevention. Mr. Robinson of Chicago stated that cracking did have some effect upon the subject and that some form of reinforcing was desirable. He stated that in severe heat the reinforced building would get a measure of protection which would not be present without some form of reinforcing. It was further stated from the floor that other manufacturers objected to the wording of this section, and Professor Woolson stated that this question had instigated a controversy which could not be settled without further consideration of the entire matter by the committee. It was suggested that that portion of the specification which touched upon the matter of cracking could be stricken out and some measure of harmony be approached. Upon motion this was done.

In the matter of floor and roof construction it was brought out that a wood joist of 3 inches was not necessary, the objection coming from the lumber manufacturers. Mr. Robinson sustained the objection of the lumber people by stating that he had recently made a severe test of a wood joist covered with metal lath and plaster and found that it would stand the fire for more than one hour. He stated that in preparing the wood and finishing he had not used nails or staples for fastening the metal lath to the wood but used very heavy wire so that the metal lath expanded somewhat and added further to the resistant power of so doing. In addition Mr. Robinson proposed that in the deadening felt between the floors a light sheet of asbestos be used. He had experimented with such a combination and found it added somewhat to the general fire resistant results. In addition, he said that this asbestos sheet would be found more economical.

In discussing stairways, elevators and other shafts it was decided to eliminate the sentence relating to self-closing doors on stairways as not being pertinent to the subject under discussion.

Discussion arose also over the 25-foot exposure specified under protection for exterior wall openings. Many felt that it was too severe a requirement while others were of the opinion that in some instances it was not severe enough. For instance, it was brought out that a building within 50 or 60 feet may be of a more hazardous nature and in that case fire windows may be necessary and desirable. It was also suggested that the exposure be measured in degrees rather than feet.

With the matter of tanks under consideration objection was made that the specification was too lenient where it stated that tanks on roofs may be supported by wood. It was moved and carried finally to change the wording of this paragraph to read "Support of roof tanks may be left to the authorities having jurisdiction." The report was approved on condition that it be referred back to the committee to reconsider those points which had come under discussion.

Prior to action on the report George A. Madison of St. Louis stated that it was time that the N. F. P. A. take cognizance of the housing situation in the United States and that the Committee on Building Construction take up the matter and prepare a tentative set of building regulations which would assist architects and builders to work into the right channels of safety. On motion this matter was referred to the committee, with the request that it take some action toward this end. Professor Woolson stated that he was chairman of a committee appointed by Herbert Hoover on this same subject and that he would be glad to have suggestions from all the members of the Association. Mr. Kempston of San Francisco stated that at the present time a dwelling of the same class costs approximately 40 per cent more to build in the larger cities than in certain communities and that therefore it would be well to take this into consideration also when making up any rules and regulations that would further increase the cost of construction.

The Report on Small Hose Couplings was approved with the recommendation that it be referred to the Executive Committee after the committee had ironed out one suggestion as to the few changes made since the report was submitted last year. This suggestion was simply that

manufacturers had started making the size of coupling which caused discussion at the last annual meeting. The committee was requested to look into this particular.

Thomas R. Murphy, chief engineer of the San Francisco Department, went into the San Francisco salt water high pressure fire service system, pointing out the construction and the advantages to be gained in case of conflagration.

The report of the Committee on Gases was also tentatively adopted, pending further investigation into the matter of refrigerators.

F. J. T. Stewart read the report of the Committee on Inflammable Liquids, and it was adopted.

An excellent address, notable for its clear-cut statements of facts, was made by Paul G. Redington of the United States Forest Service. Mr. Redington pointed out the fact that most of the fires in the United States forests are the result of carelessness on the part of tourists and campers. He stated that convictions during the past year have aided in the work of education and he found a responsive note in the convention when he told of his efforts to have the manufacturers of tobacco and cigarettes place within the package a note of warning to the user as regards the danger of fire from careless handling of tobacco. He offered a resolution calling for active support on the part of the Association for the Snell bill now before Congress; this bill if made law would result in greater accomplishments in fire prevention and would allow of reforestation. This resolution was later adopted by the Association after a suspension of the rules and its reference to the Resolutions Committee.

Professor Woolson spoke in favor of a resolution commending the Governor of California and the State legislators in the enactment of the new California housing law, particularly to that portion which will prohibit the use of the wooden shingle.

The report of the Committee on Hazardous Chemicals and Explosives was read by George W. Booth, chairman, and adopted without change other than one or two editorial errors.

W. S. Boyd referred to the report of the Electrical Committee, and brought forward a number of objections to certain specifications presented on behalf of the Massachusetts Municipal Electrical Inspectors. As most of the suggestions were already before the committee for further consideration no action was taken, but the objections were referred to the committee.

Mr. Robinson asked for the appointment of a committee to study and define the measure of the fire hazard in different occupancies.

John H. Schively spoke briefly on the contest being waged on the Pacific Coast for the Ince Trophy, which has now become nationally known.

A resolution calling for investigation of oil in navigable waters was read into the records.

The report of the Committee on Resolutions consisted of a recommendation of the adoption of the resolutions relating to the Association's platform without change. This was unanimously adopted.

F. E. Cabot of Boston read the report of the Nominating Committee, upon which W. E. Mallalieu was re-elected president for the coming year.

Chicago had several delegates on hand to invite the Association to convene in that city next year.

Resolutions were read into the records thanking the City of San Francisco, the San Francisco Chapter and the San Francisco Fire Department for the hospitality extended.

Mr. Robinson stated that the city of San Francisco had set a precedent which would be hard for many other cities to follow in the way of entertainment and general hospitality. The delegates were met on their arrival in San Francisco by the San Francisco Fire Department Band and a large delegation of members from the San Francisco Chapter. Each day they were supplied with flowers in their hotel rooms, and various other appreciated courtesies were shown them.

Safety Work of the Federal Government

By the late Edward Bennett Rosa and Charles E. Oakes
Of the United States Bureau of Standards

THE Federal government is interested in scientific and industrial research calculated to develop apparatus, methods and processes usable in groups of industries, particularly if successful completion will result in the increased health and safety of the nation.

Standardization becomes necessary as the use of the article becomes widespread for one or more of the following reasons:

1. The product may be in such general use that it is applicable in many industries and hence must be interchangeable. Examples are screw threads, etc.

2. In order that an equitable basis of competition be established it is necessary that equipment be manufactured to the same specifications and subjected to the same tests.

3. In the interest of increased production and decreased cost per unit, a standardized product is necessary.

4. If the apparatus or practice is used where the safety of the public or of industrial workers is dependent on its proper functioning, it should be designed upon correct principles and constructed with adequate factors of safety, determined by co-operative action between the government (Federal, State and city), the manufacturer, and other interested parties, and enforced by the police power. The federal government is particularly interested in the prevention of accidents and disease. This interest takes the form of the formulation of codes of safety rules, essentially a work of co-operation in which the National government, the States, technical societies, insurance organizations and manufacturers take part, each contributing the results of its individual experience.

THE WORK OF THE BUREAU OF MINES

A large part of the research work of the Bureau of Mines is concerned with the prevention of accidents. Some of the earliest work of this bureau was concerned with the determination of the effect of carbon monoxide on men. Leading up to the development of the Gibbs mine-rescue apparatus, considerable research work was done on the effect of various percentages of carbon dioxide and of a deficiency of oxygen on the human system. Similar work with poisonous gases was necessary in developing commercial and army gas masks. Other research work involving gases was the determination of limits of explosive mixtures of methane, gasoline vapors, and acetylene in air; the volume and composition of exhaust gases of gasoline mine locomotives and of automobiles and trucks; and the development of portable instruments for the determination of carbon monoxide, carbon dioxide and oxygen in mine air.

The Bureau of Mines has co-operated with State and city governments and other organizations in the formulation of codes and laws furthering safety in mines. Complete sets of rules and regulations for metal mines and for the use of electricity in bituminous coal mines, have been drawn up, and both have been used as the basis of State laws relative to these subjects. Another very important work of the Bureau of Mines was the establishment of the "Permissible System" specifications embodying the minimum requirements for safe use in dangerous places, or under dangerous condition. A piece of apparatus or material, upon the satisfactory completion of tests, is granted a certificate of approval for safety and is entered on the Bureau of Mines' List of Permissible Equipment. Permissible schedules, used voluntarily by mines, with a consequent reduction in accidents and mine fires, have been established for explosives, self-contained oxygen mine-rescue equipment, gas masks, electric lamps for

Editor's Note.—As published by SAFETY ENGINEERING, this article is an abstract from a more exhaustive paper previously unpublished in any form. It was found on Dr. Rosa's desk awaiting his attention after his sudden death last May.

mines, flame safety lamps, explosion-proof motors, coal-cutting equipment, storage-battery locomotives and blasting machines.

This bureau is training miners in first-aid and the use of mine-rescue equipment by means of its 8 mine-rescue stations, 7 mine-rescue motor trucks and 11 mine-rescue cars.

PUBLIC HEALTH SERVICE

The Public Health Service has conducted and is now conducting extensive researches in the field of sanitation and health insofar as it concerns industry, including the efficiency of ventilating systems, air conditions, dermatic hazards from oil and other materials used in the operation of machinery, lead poisoning in the pottery industry, hygienic practices in foundries, and industrial fatigue.

INTERSTATE COMMERCE COMMISSION

Under an order of the Interstate Commerce Commission, carriers are required immediately after the occurrence of a collision, derailment or other accident resulting in the death of a passenger or employe on or about the trains, engines or cars, to report it to the commission. A comparatively small percentage of the accidents reported are investigated by the Bureau of Safety; the selections for investigation are either those where it appears that recommendations looking towards increased safety should be made, or those involving large losses.

Periodical inspections of locomotives are made. Locomotives which do not comply with the requirements of the law plus a code of rules prescribed by the commission under the terms of the law, may be ordered out of service. Accidents resulting from failure from any cause of locomotive boilers, rails, or other equipment resulting in the injury or death of one or more persons are investigated. The results of these investigations are published, and in cases used by the railroads to correct similar conditions.

The Transportation Act of 1920 confers upon the commission increased authority relative to safety matters. It provides in Section 26 of the amended Interstate Commerce Act in part as follows:

> "That the Commission may, after investigation, order any common carrier by railroad subject to this Act, within a time specified in the order, to install automatic train-stop or train-control devices or other safety devices, which comply with specifications and requirements prescribed by the Commission, upon the whole or any part of its railroad, such order to be issued and published at least two years before the date specified for its fulfillment. . . ."

BUREAU OF STANDARDS

In a great many cases the researches of the Bureau of Standards have led to improvements in design and practice for the express purpose of preventing accidents.

An investigation of methods and apparatus for using the magnetic properties of materials as an indication of the quality and mechanical properties has been under way for several years. It is predicted that the day will come when every railroad rail will be so tested for mechanical flaws before it is laid, instead of being accepted after lot-tests involving the performance of only a few.

On account of the widely different regulations adopted by various States and cities for the control of automobile headlights, the Bureau of Standards made a study of this subject, and has assisted the engineering societies and States in drafting a standard regulation for these headlights.

Research work has been done on hazards in the generation, distribution and use of electricity and illuminating gas. The result is the National Electrical Safety Code, two editions of which have been issued for criticism. A third edition is now in press and will be recommended by the bureau for adoption. A similar code, the National Gas Safety Code, is being prepared for the illuminating gas industry.

Other researches toward the standardization of safety practices, which may be cited as examples, are: an investigation of glasses for protecting the eyes from injurious radiation encountered in industrial pursuits such as arc welding, the results of which will appear in a new publication, the National Safety Code

for the Protection of the Heads and Eyes of Industrial Workers; tests on the fire-resistive properties of structural materials, and an investigation of the effectiveness of elevator interlocks.

The results of research and testing in the field of aerodynamics and the strength of materials are being used by manufacturers in their specifications for materials to secure a product whose use will be attended with fewer accidents.

THE BUREAU OF LABOR STATISTICS

A study of accidents in the iron and steel industry, conducted by the Bureau of Labor Statistics, has shown (1) that the severity of the accident as well as the number of accidents must be considered in analyzing the economic loss due to accidents and determining upon methods of preventing their recurrence, and (2) that the severest accidents are usually due to faulty methods of operation or unsafe devices. Some attention has been given by this bureau to the study of the accident experience of the builders of heavy machinery.

For the information of manufacturers and the public, the laws relating to labor including those bearing upon safety have been collected and published from time to time. This bureau has given considerable attention to the standardization of accident reports. This work has been done in co-operation with the states and is of considerable importance to the engineer as well as the statistician, as it places the comparison of accident statistics upon a better basis, and allows a more accurate judgment as to where prevention measures are most needed.

CO-OPERATION BETWEEN GOVERNMENT BUREAUS, STATE AUTHORITIES, TECHNICAL SOCIETIES, MANUFACTURERS' ORGANIZATIONS, ETC.

It is not only a policy but a necessity with all the government bureaus engaged in standardization and research work except in the field of interstate transportation, to co-operate with the State accident boards and commissions, the municipalities, the technical societies, manufacturing, insurance and other interests concerned. Without power to enforce any measure, in many cases Federal bureaus have been asked to arbitrate between conflicting interests in the application of rules or regulations. As an example of this there may be cited the arrangement whereby questions as to correctness of the tests on electrical devices by the Underwriters' Laboratories, may be referred to the Bureau of Standards for decision.

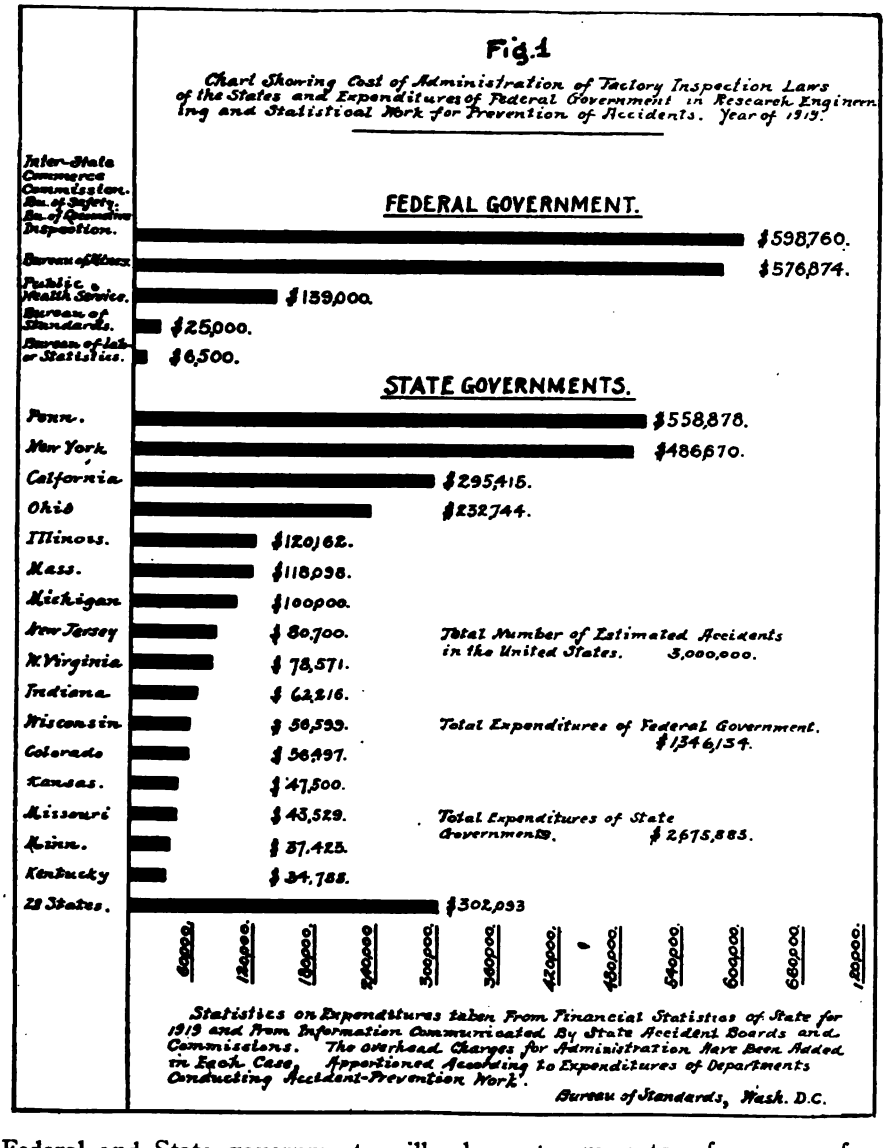
Engineers from the Federal bureaus have in many cases been designated to assist the States in their work. The Bureau of Mines has by agreement with the State of California designated an engineer to serve as chief mine inspector. This Bureau is assisting many other states in the solution of problems arising from the administration of their mine inspection laws. The Bureau of Standards has officially designated representatives serving on committees of 3 State industrial commissions and has been assisting a number of other important industrial States in the drafting of rules and regulations pertaining to safety.

As an example of the interest the Government bureaus are taking in the work of the technical societies, the Bureau of Standards is represented on about 25 committees of 14 technical organizations whose activity is concerned with Safety.

EXPENDITURES OF FEDERAL AND STATE GOVERNMENTS FOR ACCIDENT PREVENTION WORK

The Federal government spent in the fiscal year ending June 30, 1920, about $1,350,000 for accident prevention and sanitation work in all the industries of the country, including transportation, mines and manufactures, a tax of 1.3 cents per capita. The part of this amount used for accident-prevention work in the manufacturing industries represents an expenditure of 8 mills per $1,000 of the value of manufactured products. In the case of mineral products the Government spends about 9.5 cents per $1,000 of the annual value of these products. These expenditures are practically all for research and engineering work. The inspection of industrial plants for the purpose of law enforcement is not a part of the work.

A comparison of the expenditures of



the Federal and State governments will prove interesting. Fig. 1 shows the expenditures of the departments of the State governments which conduct accident-prevention work. This comprises engineering, sanitation and factory inspection work, but by far the larger part of the money spent is devoted to the last named. There is shown also the total amount for all the States, $2,723,000, which is double the expenditures of the Federal government for Safety and related purposes. As would be expected, the industrial States are spending the largest amounts of money for this work.

STANDARDIZATION

The demand on the government bureaus for their services has grown in the past few years. As the governmental functions of the States have grown, there has been an increasing tendency to base their laws on established engineering facts. They have consequently taken a deep interest in the standardization of industrial practices, especially where their own field of activity is concerned. Engineering societies and manufacturers'

organizations have for some years been deeply interested in and have done a great deal of engineering and industrial standardization.

The need for a central agency through which these attempts at national standardization could be cleared has been apparent. To provide for this need there was organized, as the outcome of two conferences held at the Bureau of Standards in 1919, the American Engineering Standards Committee, to co-ordinate the efforts of the many organizations engaged in safety standardization work. The formulation of national safety codes was unanimously placed under the auspices of this committee.

There has been organized a National Safety Code Committee as a sub-committee of the Standards Committee, whose duties are to report on the safety codes required, to decide on the priority of consideration of the codes, and to recommend sponsor bodies for their preparation. Since the committee started its work, about January 1, 1920, 40 subjects have been under investigation and definite recommendations on most of them have been submitted to the American Engineering Standards Committee. It has been the purpose of the committee to suggest as sponsors only those organizations which are able to give the work immediate and consecutive attention, and which will have the co-operation of all concerned. This has resulted in the distribution of the work among a large number of organizations. The classes of organizations which are taking part in the work are as follows: Federal bureaus, organizations of State officials, technical societies, and insurance and manufacturers' organizations. Sponsors for 15 codes have already been designated by the Standards Committee and have accepted the responsibility of formulating safety codes. Of the 40 codes under consideration federal bureaus have accepted sponsorship either as sole or joint sponsor for only a small percentage of the total number of codes to be formulated.

Included in the program of work which has been alloted to the Government bureaus are some codes upon which considerable work has already been done; for example, the National Electrical Safety Code, and the National Safety Code for the Protection of the Heads and Eyes of Industrial Workers. In order that this program of work be undertaken and pushed to early completion it is necessary that these Government bureaus be provided with sufficient funds. For the present fiscal year the amount appropriated for this work is considerably less than that expended last year. These bureaus find themselves then in the position of being asked to participate in work of a constructive character, which is difficult to do because of lack of funds. The cost to the taxpayer for the work would be about one-fifth of one cent per capita per year which seems an insignificant sum in comparison with the saving which will be effected by the elimination of needless duplication of work, and with the probable resulting reduction in the number of accidents and the consequent economic loss in wages and in compensation paid for accidents by the industries and States.

Casualties per Locomotive-Mile

WHILE employe fatalities per locomotive-mile on the Delaware & Hudson Railroad have been steadily decreasing from 1918 through 1920, other injuries increased between 1919 and 1920. In 1919 the number of locomotive-miles per fatality was 1.87 times as great as in 1918, and 1920 showed a gain of over 8.9 per cent on 1919 in this ratio in favor of safety work.

The same favorable ratio does not obtain with the other casualties, however. While 1919 was a gain of 48.1 per cent on 1918, 1920 falls 5.14 per cent under the 1919 figure.

Safety Features on High Voltage Transmission Lines

By C. O. von Dannenberg

of the J. G. White Engineering Corporation

Proceedings of the American Society of Safety Engineers

THE following notes cover a brief review of certain features in high voltage electrical installations to which it is believed particular consideration and attention should be given in order to attain a maximum degree of protection and safety.

It is not intended to discuss the subject from a technical standpoint, but to state some of the features of greatest importance in a simple way and where possible to illustrate by definite examples or application by means of lantern slides, showing conditions as they exist in actual practice. For very detailed information on this subject you are referred to various publications of the National Electric Light Association, and to the National Electrical Safety Code, third edition, dated October 21, 1920, Handbook Series, Bureau of Standards, issued in 1921 by the Superintendent of Documents, Government Printing Office, Washington, D. C.

As a general statement it may be said that fewer accidents result in the operation of high voltage than in low voltage equipment, that is, for operation at 600 volts or less. This statement is, however, somewhat misleading for the following reasons:

1. The number of persons handling high voltage equipment is much smaller, as low voltage equipment is in far greater use.
2. High voltage equipment is much less accessible and is usually placed out of reach.
3. The persons handling high voltage equipment are usually of greater intelligence.
4. The knowledge that a high voltage exists tends to lead to greater care in handling equipment.

The points under consideration will be referred to first in a general way.

LINE STRUCTURES

For transmission lines the strength of the structure deserves the most serious consideration. The construction of wood pole lines is more or less standardized, but with steel pole and tower lines certain modified designs with members cut down to the lightest possible section have given much trouble. In this connection the type of tower known as the "A" frame has certain inherent disadvantages, since this structure is flexible in the direction of the line. Due to this fact there have been cases where towers have fallen before the conductors have been attached and the writer has in mind an experience where it was necessary to guy each tower in two directions due to a severe accident resulting from the instability of the structure.

In reference to the strength of the conductors, various engineering societies have endeavored to standardize on certain definite loadings, and it is to be strongly recommended that no conductor have a tensile strength of less than twice the estimated strain to which it is to be subjected.

Regarding various types of insulators in use, very little trouble has been experienced from the failure of pin insulators due to mechanical defects. In the case of insulators of the suspension type which are ordinarily used in direct tension, there have been mechanical failures with those of the cemented type, and it is obvious that the efforts are to be encouraged toward the introduction of insulators of the type from which the cement has been completely eliminated or in which it has been replaced by some material less apt to give future trouble.

In connection with wood pole lines particular attention should be given to the following:

1. Climbing space.
2. Buck arms.
3. Pole steps.

In the matter of climbing space valuable suggestions and recommendations have been made by the N. E. L. A. and the Bureau of Standards, but it may be said in general that if 6 inches were added to the pole spacings recommended by the foregoing authorities, there would be considerable less trouble due to the confined limits in which a lineman is forced to work.

In connection with the spacing of lines it is urged that every effort be made to arrange the various conductors of a distribution system so that they shall maintain as far as possible the same relative location on all poles and other structures. This feature is important in order that linemen and other workers can be shifted from one district to another and be able to handle work on line connections with the least likelihood of making a mistake.

In the matter of buck arms, the work on poles would be greatly facilitated if these could be eliminated as far as possible, or in other words, at any corner pole where there was a great concentration of lines it would be better to continue the circuits for another span in each direction and make the inter-connections between circuits aerially rather than to attempt to do so on a corner pole where the crowded condition due to the addition of buck arms would make it dangerous to work.

In the matter of pole steps, considerable trouble and many accidents have resulted from not providing them at necessary points, particularly corner poles, poles on which certain lighting fixtures are attached and poles on which switches or other special fixtures are erected. Poles located at such points are usually climbed oftener than other poles, which results in the cutting up of the surface and in time make them very difficult and dangerous to climb. The addition of steps, therefore, will undoubtedly help materially to relieve this condition. The tendency to omit steps from poles is obviously more prevalent among the smaller companies than among the larger ones that have made every effort to standardize their methods of construction and to make their installations as safe as possible.

LINE DISCONNECTING SWITCHES

In connection with the operation of transmission lines, particularly on circuits of great length, it is usually necessary to provide means for separating them into sections at various points. In the past it has been common practice to install ordinary disconnecting switches operated by a portable hook stick. We have preferred to install a switch of the mechanically operated type wherever possible.

With the ordinary type of disconnecting switch it is necessary for the patrolman to climb to a point some distance from the ground and then operate the switch by means of a hook stick. With the latter type the operating handles may be placed at a convenient level close to the ground.

To the operating man the far greater safety in operating the latter type of switch is particularly apparent, especially when it becomes necessary to do any switching at night, as there is definite assurance of the safety of the operator sent to do the work.

GROUNDING

Many accidents have resulted from not grounding effectively metal structures carrying high tension conductors. In the case of a transmission tower line carrying two circuits, it is usually the case that one circuit is carrying load when the other circuit is being worked on, and in such cases high potentials to ground may exist. All danger can be eliminated by suitably grounding conductors on the circuit being worked on, but unfortunately the methods used have at times been very ineffective. For many years it was considered sufficient to simply throw a chain over the conductors of the dead circuit at one or more points of the section being worked on. In this connection it may be stated that the only safe ground is one that makes an absolute permanent and positive connection with the line conductors and with the tower. This condition may be obtained in the case of the transmission conductor by the use of a flexible conductor having

its ends equipped with clamps to allow a permanent and positive connection to be made to the tower and to the conductors. The Johnson clamp, as referred to hereafter, may be used in connection with line conductors and a clamp similar to that used in motor testing work for connection to the steelwork of the tower.

TELEPHONE EQUIPMENT FOR HIGH TENSION LINES

In connection with transmission work, a great deal of trouble and many accidents have occurred in connection with the operation of telephone equipment. Except in the cases where the telephone circuit is carried on a separate pole line, the telephone conductors are usually mounted on the same structure a short distance below the power conductors and are, therefore, subject to high induced potentials to the ground, depending on the load conditions of the power circuits and the conditions of the power lines insulation.

As a rule the potentials to ground are of such a value that there is no definite, visible or audible, indication of their presence. It is desirable, therefore, that any switching equipment in direct contact with the line conductors be so located that any accidental contact may be absolutely prevented. By the use of insulating transformers and drainage coils it has been possible to do away with the use of insulated platforms, which are not at all desirable from an operating standpoint.

WORKING ON LIVE LINES

In the earlier days of high-tension systems, work on live lines was practically limited to 2,300 volts or less, and even then many accidents and fatalities resulted, but as the slogan of the operating man became that of continuity of service every effort has been made to do repair or other work with a minimum amount of interruption to service. The use of rubber gloves was resorted to, but unfortunately these were first used without suitable protective coverings and as a result many fatalities occurred because too much dependence was placed on them. In general, it is not advisable to use rubber gloves under any condition of working without having them provided with a suitable leather or buckskin covering which will protect it effectively against any ordinary wear.

A further step has been made in requiring a lineman to wear rubber boots when working on live lines, particularly in wet weather, as many fatalities and accidents have resulted from contact of some other portion of the worker's body with a live conductor even though he was wearing rubber gloves.

Insulating shields, consisting of heavy rubber coverings, are being used for protection, but unfortunately when working among lines that are rather closely placed they are rather bulky for use. Their use, however, is to be recommended wherever possible.

Under the usual conditions of operation work on live lines has generally been limited until quite recently to voltages not exceeding 2,300 or 4,000. The increased desirability, however, for continuous operation has caused considerable effort and study to be made to overcome the necessity of requiring a circuit to be shut down when it was necessary to do any work. The necessity for working on live lines is particularly important in connection with transmission circuits, which supply energy for large communities and large manufacturing industries, where an interruption is of very great importance.

In this connection particular credit should be given to T. F. Johnson, Jr., of Atlanta, Ga., who has developed a very complete line of tools which make it possible to work on live transmission lines and other circuits with complete safety and with the assurance that the work can be successfully and reliably done. These tools are not available commercially, however.

Why Thrifty Employes Suffer Fewer Accidents

By B. M. Grant

Manager, Government Loan Organization Second Federal Reserve District

EMPLOYERS are coming more and more to realize the intimate relation between the outward acts of an employe and the employe's state of mind. A large proportion of avoidable accidents are, undoubtedly, the direct outcome of a dangerous mental condition of the worker. Of a sudden, something happens. It is found that the employe's mind was not actively on his work, on himself, on his surroundings. Something foreign, perhaps an overpowering worry, was absorbing his attention, and in that moment of absent-mindedness or carelessness an accident occurred.

FINANCIAL WORRY CAUSES ACCIDENTS

The belief is growing among experienced Safety Engineers that a great number of avoidable industrial accidents can be laid at the door of worry and other mental disturbances brought about by *financial embarrassment*. This opinion has lately been supported by the medical profession.

OPINION OF PROMINENT PHYSICIAN

That heart-aches over financial difficulties and the resultant fear of the future have been responsible for the acute nervous state of many people whose pocketbooks have been affected by the business depression, was an opinion recently expressed by a prominent physician. This statement was made to Richard Spillane, the well known journalist, during a conversation on the relation of individual health to success. After pointing out that in recent months the number of his men patients had exceeded that of women, the physician said:

"The majority of the men who come to me are sufferers from nervous disorders brought on by worries. The physician is the father confessor, so far as human ailments are concerned. To diagnose a case of 'nerves' or the troubles that develop from overstrain of the nerves, it is necessary to know the cause of the patient's worries. In nearly all my cases I have been informed by my male callers that *they have suffered monetary losses in their business* or in speculation; that they are near the end of their resources, or think they are, and that they have *fears regarding the future.*"

SAVINGS HABIT MAKES WORKERS CAREFUL

To the extent that a man or woman accumulates a reserve fund through regular and systematic saving he or she develops reserve and cautiousness, characteristics which express themselves in the whole mental life of the individual. Such persons grow in a sense of self-possession and self-protection. Their minds are on their present activities because their lives have become more adequately harmonized and their financial worries have given place to financial complacency.

An employe who has accumulated a reserve fund does not spend many sleepless nights or anxious days worrying about his future. He is more efficient and careful around machinery and is not likely to meet with accidents brought about through excess worry.

GOVERNMENT SAVINGS ASSOCIATIONS

The best method to allay financial worries of employes is to encourage them to save and save *regularly.*

Employers who have had Government Savings Associations in their plants for some time have testified that since their employes have learned the habit of saving they have become more careful not only of their own money, but of property and materials.

There are nearly 2,000 such groups in the Second Federal Reserve District.

Seeing Ahead With the N. F. P. A.

By Lloyd Marshall

Member of the National Fire Protection Association

Proceedings of the American Society of Safety Engineers

WHEN I was invited to speak about the educational activities of the National Fire Protection Association, I was asked to make my talk "impromptu" which is unfortunate. "Impromptu" talks are generally very brilliant—having been carefully prepared long in advance. But I am going to follow Mr. Chauncey Depew's formula. He says the only way to make a *good* speech is to stand up, speak up and shut up! If this applies to *men* how much more does it apply to a mere woman!

No doubt most of you are familiar, at least in a general way, with the various departments of the National Fire Protection Association. Its Committee on Public Information, of which I am a member, is the link that connects the scientific experiments and investigations of the technical committees with the general public. And the general public must be reached so that not only engineers, architects and fire prevention experts understand and demand improved laws, codes and various devices, but men and women in no way connected with building or public offices also understand and demand them. We know that reducing the tremendous yearly fire waste and the large loss of life in our yearly fires, is largely dependent upon getting the general public to become careful through knowledge and to demand the safer, more modern ways of eliminating fire hazards.

FILM SAFETY EDUCATION NEEDED

The average man or woman could not understand the work of the technical Committees on Gases or Hazardous Chemicals and Explosives, for instance; but translate the results of that work into understandable terms governing slow-burning films and other parts of the operation of moving pictures, and they would demand safety in the "movie" houses they patronize. Through the co-operation of the N. F. P. A. member, the National Association of the Motion Picture Industry, fire hazards in moving picture exchanges have been greatly reduced. However, flammable films continue to be shown in many towns and cities in buildings without protective booths and in defiance of laws and ordinances governing the showing of films. Also, more and more public schools are using the movies in their buildings; and until men and women understand the danger of having moving picture machines without standard booths, and of showing films that are not of slow-burning stock, just so long will we have that many more school fires, and we have enough as it is. So the Committee on Public Information has printed a leaflet dealing with this matter which they have widely distributed. Now the association is working upon getting distinguishing markings for the slow-burning films that are safe. At present the largest film manufacturer in America has undertaken to mark all his films of slow-burning stock with the words, "Safety Film." The Committee on Public Information wants to make this, through education, a universal practice which will go far towards making films safe.

FIRE EXTINGUISHING ASSESSMENT LEGISLATION PROPOSED

Another important work of the committee, perhaps its most important one in its effect upon the whole country, is the effort to secure legislation fixing the cost of extinguishing preventable fires upon persons disobeying fire prevention orders. Model laws and ordinances have been drawn up and bills on the subject were presented in several States during this past year. While no State passed the measure, a great deal of valuable public educational work was accomplished. The discussion in the various legislatures and the newspaper comments upon the bill attracted wide attention and will help to lay the foundations for suc-

cessful legislation at future sessions.

Doubtless all of you know something about this bill and approve of the common law principle of personal liability. If a man runs into your automobile and damages it you can sue him for the damages, but if your house burns down through the carelessness of the neighbor next to you, there is no law compelling him to stand your losses. During 1920 and the first five months of this year, there has been a heavy increase in fire losses, not only due to deliberate incendiarism but also due to the slackness of those caring for business properties during this time of business depression. In 1916, 7,493 incendiary fires were reported, which, after the war, dropped to 908 in 1919. Although unable to give authoritative figures for 1920, it is estimated that the 1920 incendiary fires will equal or *exceed* the large number that occurred in 1916. Obviously, if we already had the personal liability law which makes a man pay for having a preventable fire, we would have not only fewer incendiary fires by regular fire-bugs who put torches to buildings, but also we would have less unconscious incendiarism, which means carelessness.

CONFLICTING COURT DECISIONS

Right here in New York there is this law in the city charter, that if a man disobeys an order of the Fire Department he shall be responsible to the city for the cost of extinguishing the fire due to his disobedience. Down in lower New York a cemetery company had a four-story building full of caskets packed in straw and other stuff which made a very bad fire. Two years before, the Fire Department ordered this company to install automatic sprinklers, but they did not do it. So after the fire, the commissioner brought suit for $1,500, which was the cost of extinguishing the fire. The lower court decided for the defendant. But the commissioner took the suit to the upper court which reversed the former decision and made the company pay the $1,500. Besides New York City, Cincinnati, Cleveland and a few other cities also have this law which the Committee on Public Information hopes to make universal.

FIRE PREVENTION REQUIRED IN SCHOOL CURRICULUMS

The campaign started during January of this year by the National Association of Credit Men, members of the N. F. P. A., to secure the passage of the bill making the teaching of fire prevention compulsory in all the schools and colleges, was successful in California, Ohio, Rhode Island, West Virginia, and Wisconsin. New Jersey passed this bill last year, which makes six states having the law. Teaching school children careful habits and making them conversant with the common fire dangers, so many of which exist in residences, will undoubtedly be carried back into the homes where there is such a tremendous yearly loss of both life and property. We are expecting this bill to be brought up again in the various legislatures later on, and this time passed. When the Personal Liability Act and the Bill for Teaching Fire Prevention become universal laws, the country as a whole will have a greatly reduced fire bill each year, to say nothing of a yearly saving of twenty thousand lives.

WOMEN'S CLUBS' FIRE PREVENTION PROGRAM

My own part of the work of the Committee on Public Information consists in trying to give fire prevention ideals and facts to the great number of public-spirited women of the country through the General Federation of Women's Clubs and other organizations civically-minded. The Sub-Committee on Schools, Hospitals and Institutional Buildings, of which I am chairman, has prepared a "Program for Fire Prevention Committees" and an "Investigation Sheet." The former is an outline of what club women can do and how they can do it. The Investigation Sheet, which was most carefully prepared with the help of prominent experts, is used when actually inspecting conditions in schools and other such buildings. At the present time, not only are both of these used by clubs all over the country. but also various State Fire Marshals are using them, exactly as prepared by this committee, in their work.

Short articles on schools, hospitals and conditions in general have been prepared also. Last June I made an address before the last convention of the General Federation of Women's Clubs, held in Des Moines. The address was reprinted by the N. F. P. A. and distributed to its whole membership through the Committee on Public Information. This leaflet is being used as fire prevention text material in most of the public schools of Philadelphia and in a few other cities.

But as yet, the majority of women have absolutely no knowledge of fire hazards nor of the modern methods and construction that will safeguard buildings. Naturally, women's chief interests lie in the homes and schools. *These two classes of buildings represent the field of greatest loss from the life point of view,* and the financial loss is one of the greatest. Imagine what good will be accomplished when women finally awake to serious endeavor. Unfortunately, even after the educational work that has been carried on over a long period of years, women still think that fire drills and any kind of fire escapes are all that is necessary in the way of safe-guarding their children while at school. Another point is that women do not understand why they should be concerned about existing conditions. When they hear in a lecture or read in a leaflet that we have an average of six school-house fires every day in the year they are properly shocked, but they do not believe it touches *their* towns and *their* schools. They have said to me, "Why, we have a fine up-to-date fire department with officials who are *paid* to look after things, so our town must be all right. Of course, it's dreadful about the others ———!" And citing several other public officials, including members of the school board, whose duty it is to "look after fires," they conclude that their city is a startling example of efficient, safe modernity. Not long ago I received a letter seriously stating that, "Our schools are *amply* protected against fire prevention." Because there is this general, wide-spread ignorance, everyone should help to spread real fire prevention propaganda. It is the more necessary, because we still have plenty of men also who take great pride in their dashing, automatic, expensive Fire Departments, to spread the gospel of *prevention.* Both women and men are needed, and the N. F. P. A. is trying to get all of the citizens of the United States to take part in this vital work.

Briefly, this is part of the principal work of the Committee on Public Information, a complete outline of which would take entirely too long. The National Fire Protection Association needs not only the engineers, architects and fire prevention experts of the American Society of Safety Engineers, but every man, woman and child in the land. But it is chiefly men and organizations like this, that can and should take the most prominent places in spreading real fire prevention knowledge and in taking a decided stand for the most approved methods of safe construction and modern safety aids. Yours is the great opportunity to serve America by *modernizing* America's buildings and fire laws, thus making them safe.

Fires in Oil and Distillate Tanks

OIL refineries and plants manufacturing pine tar distillates are too frequently the scenes of terrific fires, as their stocks are of the most flammable and explosive nature. The Atlantic Turpentine & Pine Tar Company, whose plant is on the Louisville Road outside Savannah, Ga., was recently the victim of a fire of unknown origin which caused a loss approximating $26,000. The plant was shut down at the time of the fire, with only the office force on duty.

The wooden oil barge "Bolikow," property of the National Oil Company, docked at a wharf of the Southern Pacific Railroad, Pier A, Galveston, Tex.,

was a total loss in a fire caused by a spontaneous combustion explosion. It contained at the time of the explosion about 14,000 barrels of crude oil. The loss on barge and contents was $290,000, and in addition the adjoining wharf property was damaged to the extent of $320,000.

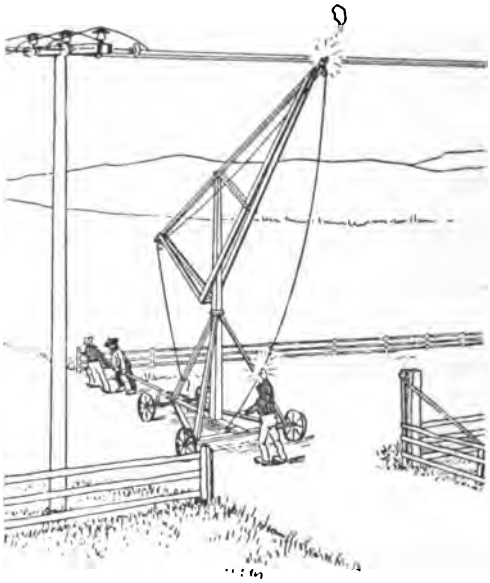
The Bonner Oil Company, Houston, Tex., lost $79,125 in a warehouse fire probably caused by sparks from a locomotive. The Grayburg Oil Company, San Antonio, Tex., suffered a total loss on its refinery in a fire caused by ignition of waste oil in an oil still. The Manhattan Oil Company of Iowa last October lost in an oil storage station fire about 57,460 gallons of gasoline, 66,750 of lubricating oil, and 39,080 gallons of kerosene, besides building and equipment. This fire was started by an explosion of undetermined origin, and the Iowa Insurance Service Bureau says of its rapid spread that it "was primarily due to the poor housekeeping, wooden supports under tanks, extreme congestion, and excessive accumulation of small empty containers."

Portable Derricks and Power Lines

THE picture shows a portable hay derrick which, the Pacific Gas & Electric Company says, a young farmer tried to move into the corner of a field alongside an 11,000-volt line:

There is a flexible wire cable running over a pulley at the end of the derrick boom. This cable was pulled to one side in order to swing the boom around. It came in contact with the power line. Just then the young man was holding the end of the cable. Current passed from the power line into the cable and through his body, killing him.

Other accidents of this kind have occurred in other parts of California. In each case a man was killed or injured by moving a derrick under or alongside a power line.



While there is no legal liability upon power companies for these accidents, superintendents, foremen and workmen should nevertheless do all they can to prevent them.

Men working with derricks or hay stackers on highways or in fields adjoining power lines should be warned of the danger of passing under or near power wires and should be asked to pass the warning along to others.

A warning at the right time and in the right place may save a life.

EDITORIAL

COLD FEET IN HOT WEATHER

EUROPEAN statesmen stand aghast at the amount of money that is being spent in pleasure while industry is paralyzed and taxes soar to meet governmental debts.

Psychologists have even attributed the abnormal demands for pleasure to solar influence and the peculiarity of the sun's present spots but, whatever the reasons may be, there is a growing tendency even in our country to find excuses for holiday-making and an escape from work.

Here we are in the midst of the vacation season and the dominant thought seems to be: How shall we relax until Fall?

Unfortunately there has been some relaxation of Safety work.

There never was a time when all should unite to emphasize the truth that Safety is something that should be furthered in summer as well as in winter, in periods of depression as much as in boom days and in periods when labor is "cheap" as earnestly as when labor is "high."

Safety is part of maintenance.

When the great "Leviathan" was laid up at her dock there was maintained a complete staff of machinists and, in spite of her rusted sides, engineers have recently reported that her boiler tubes are clean and her engines free from any spot of rust.

If your business is at a standstill, if your force is at a minimum, keep your Safety Organization intact so that when the signal comes for "Ahead—Full Speed" there will be no creaking or squeaking in your personnel. Those who do this will "get the jump" on their competitors.

Now is the time to paint your walls, re-surface your floors, clean your lighting units, renew your machine guards, re-locate, if necessary, your tools and do the thousand and one things you have been waiting for a chance to do without interfering with production.

Don't wait until Fall or for better business or for any other reason! Do it now!

HAZARDOUS LOCATION OF GASOLINE STORAGE TANKS

IN his report on the explosion in Memphis, in January, of a tank car loaded with casinghead gasoline, Colonel B. W. Dunn, chief inspector of the Bureau of Explosives, declared: "The accident brings forcibly to our attention, once more, the general hazards of gasoline and the danger involved in having large gasoline plants located so close to the main lines of railroads and to inhabited dwellings. *The country is full of such hazards and it is impossible now to eliminate them.*"

Colonel Dunn's warning applies accurately to a situation that exists in Salt Lake City.

The picture on the first page of this number of SAFETY ENGINEERING was taken a short time after lightning had struck a huge tank of gasoline distillate in the Salt Lake City plant of the Utah Oil & Refining Company. The resultant fire caused the loss of 15 lives and a property damage estimated at $1,000,000 or more. The picture shows a tank in the foreground, which exploded subsequently, killing several men who were spraying the tank with a hose. The wave of flame blotted them out like a flash.

Disastrous as it was, the Salt Lake City catastrophe might have been worse. The tanks destroyed, with others that were saved, were located near the City Hospital and numerous residences, all of which would probably have been destroyed if the fire had not been controlled by the Salt Lake City Fire Department, whose work was courageous in a high degree.

Why Should We Not Prevent Accidents?

By S. Dana Hubbard, M. D.

Superintendent, Division of Industrial Hygiene, New York City Department of Health

THE accidents which daily happen no doubt occur with such frequency and regularity that the injuring of a fellow human being becomes to many a kind of vicious habit. This condition is not limited to any one class or group of individuals or corporations, though some have this unpleasant experience more often than do others, for instance, those engaged in transportation, in express work, and in places where there is much machinery.

The vast majority of accidents are preventable. Where effort has been made with earnestness and study, accident occurrence has been in some instances entirely eliminated and in others so markedly reduced as to manifest that it had been simply ignorance or carelessness which occasioned this suffering and loss. In many places so much is done for the individual worker that he loses nature's first impulse, self-preservation, and becomes indifferent to the point of actually inviting an accident.

The loss of life and the number crippled, as well as the great economic loss, have caused public authorities, associations, and individuals to look carefully into the matter of accident causation. As a result, "safety first" campaigns have been introduced, and have been productive of splendid results with but comparatively small cost.

Statistics inform us that there are about 35,000 workers killed annually in the United States in industrial accidents; that over 2,000,000 workers are injured through accidents. The loss to production and the increased cost to the consumer through this source is almost beyond estimation. It is therefore safe to state that the loss from acc' ts is appalling.

A human life has been 'ued by courts and others as being a onal asset of about $2,000. Now 3: deaths from accidents means an ann loss of $70,000,000. This is exclusive of the loss of production and the loss of wages incident to this foreshortening of the normal span of the individual's life.

While there are many reasons why accidents should be prevented, perhaps the most conspicuous one is the prevention of maiming and crippling of persons, whose presence has a most depressing effect on the home, the community and the individual.

The loss of a valued, trained and highly expert worker is a loss impossible to compute mathematically. An accident, even of the slightest kind, disturbs the morale of employes considerably; and a sudden death from a serious accident is sufficient to practically close the plant for the time being.

Progressive people, whether business men or plain citizens, philanthropically inclined, realize to-day more than ever that accident occurence is a matter which seriously concerns every living human being. If we apply the law of general average, we find that 35,000 people alive and well to-day will be destroyed in a year, and that 2,000,000 persons healthy and happy will within the year be maimed and crippled. Who knows but that you or I may be one of this number? Therefore it behooves us, for our own personal safety, to do something toward assuring ourselves of a safe path through life and an opportunity to live our natural period of years.

Repeated accidents in a plant, on a street, or in any one place indicate carelessness, mismanagement or plain inefficiency; one or all of these factors frequently enter into these conditions. Business men to-day realize that the employer who disregards the rights of employes to health and safety is on the road which ends in loss or failure.

ACCIDENT CAUSE CLASSIFICATION

To avoid accident incidence one must naturally study its causes. What are the

factors in the causation of an accident? (A) The mechanical or physical; (B) the human element; and (C) the conditions of environment.

Mechanical Causes.—They may be incident to (1) high or excessive speed, (2) inattention to moving machinery, (3) defective machinery, (4) improperly devised machines, (5) improperly placed machines, and (6) unguarded machinery.

Instances of each of these classes will more carefully focus the cause and effect. (1) A grinding-wheel designed to stand a strain of a definite number of revolutions per minute is speeded up, either through ignorance, carelessness or stupidity, beyond its standard, and this excessive strain causes a rupture of the wheel with injury and damage. (2) The same kind of wheel may have been set properly but through use become loosened; the increased vibration causes the wheel to break and cause damage and injury. (3) In order to save a few cents on cost or installation a poor article is purchased or a good article is cheaply installed; through this shortsightedness a breakdown occurs which occasions an accident. (4) In the designing of machines the inventor should always have in mind the element of safety; but owing to cost, lack of symmetry, or other reasons, the safeguard is left out of the plan, the machine is made with the danger left in, and some unfortunate uninformed, inexperienced or careless worker comes to grief through this lack of adequate protection in the original design. (5) In placing the machine the accident risk is often disregarded in favor of other more pressing factors demanding attention. But in our view of this matter, nothing should take precedence over safety, and to place a machine so that the operator is blinded by facing too strong a light, either natural or artificial, is to invite an accident which must sooner or later occur. Shadows are often thrown across work, causing disturbance of vision and miscalculation of distance which frequently lead to accidents.

The Human Element in Accidents.—Here we must consider the subject from many angles and differing points of view. The inexperienced, the ignorant, the over-certain, the "cock-sure" old hand the careless, the inattentive, the fatigued, the improperly placed individual, the chance-taker, the unduly hurried, the unprotected, the improperly dressed, the mentally or physically defective worker, these are all risks under the human element. Amplification of these types would appear unnecessary; the title is indicative, and the subject is so large that it would more than fill the space allowed. Suffice it to say that the human element in accident causation is about 90 per cent, and that the mechanical element is about 10 per cent.

The Environmental Element in Accident Causation.—This brings us to the consideration of the physical properties of the plant or place of labor. Important among these are lighting conditions, including both daylight and artificial lighting.

And the building—if new, is it built safe? Is it arranged for safety? If it is old, the danger is in many instances greatly increased by worn stairways, defective floors, dangerous ceilings, leaking roofs, defective plumbing and fixtures, and other weak spots. As fires cause accidents which result in many fatalities, what provision is made for fire prevention? Are the stairs safe, well lighted, with nonslip steps, and are they at all times unobstructed? Are runways and ramps safe? Are the paths and aisles also lighted and unobstructed? Are the openings for ingress and egress especially in emergency (panic or fire) convenient, ample and always ready for use? Is the plant operated with an eye to safety? Are there danger placards at sites where an accident is likely to occur,—cellar doors, openings to pits, elevators, sharp turns in roads with view obstructed by stored goods or a building, craneways, coal piles, scrap heaps, railway switches? Are there posters regarding moving piled goods, keeping aisles clear, giving signals in approaching danger points, etc? Is the plant unduly overcrowded with material or the results of production? Is there an effort to operate without unnecessary noise? Nothing is more distracting or confusing than sharp, sudden and unnecessary noise, particularly the sound of the human voice. Are the elevators not

only guarded, but posted with danger placards? If alien tongues are near, is the information conveyed so as to be understood by all? Is the operation of the lift supervised from the viewpoint of safety? Is the plant regularly inspected by a committee of competent individuals at regular periods to ascertain defective or improper conditions? Is this committee required to submit a special written report? Are its recommendations considered by a conference of foremen? Are the changes suggested followed up and made?

SOCIAL REASONS FOR ACCIDENT SAFEGUARDS

Thus it is indicated that the factors entering into the causation of accidents are indeed many and some of these appear to be ever present; similarly many of these factors entering into making accidents are so easily removed that it appears negligible not to promptly do this. We make it our duty to remove those conditions liable to cause fire. Why not make it just as necessary to protect life and limb from accidents?

Employers insure against fire and many are assisted by compensation; but the worker,—why are not his or her interests likewise safeguarded? In the name of humanity this is demanded. A man or woman taking a position in order to earn his or her daily bread, or to support a family, should be protected by law, not only from becoming infected by a communicable disease but also from being killed or injured by a preventable accident.

ECONOMIC REASONS FOR PREVENTIVE MEASURES

Every industrial accident is a setback in our struggle for existence. When accidents involve human injury they not only inflict impairment of ability to earn but they occasion suffering and bereavement, and frequently consume the funds laid away for the comfort of old age. To this we must add that accidents increase the cost of production, occasion diminished profits to the producer, and make the results of labor come higher to the consumer. When specifically incident to preventable accident causation they are not only unnecessary but wasteful.

One of the main reasons why accidents should be avoided is that when experienced employes are killed or maimed it becomes more difficult by just the amount of their skill to replace them. An expert's place cannot be immediately filled, whether this expert is a fireman or a skilled mechanic of the highest type. Individuals must be trained; training costs money, and time is necessary to acquire experience.

The effect of an accident on the morale of the plant is a factor often overlooked. If some efficiency expert could compute the loss in time and production caused by accidents, in many instances the figures would show losses far beyond the amount incident to the part played by the injured. Accidents prevented soon save the expense incurred for their prevention.

The success of a plant in eliminating accidents often depends upon the care given to training and supervising employes. Reiteration is constantly necessary.

In conclusion, a plant that is having frequent and repeated accidents, as some in this vicinity do (one plant had three accidents in three days at the same machine, and no doubt would have had others but for an estoppal order, forcing workroom rearrangement and the placing of a machine to remove light-glare and shadow-obstruction), is a positive indication on the part of the plant management not only of ignorance but of utter disregard of humanity. It operators may be charged with indifference to the comfort and welfare of the human worker. The breaking up or scrapping of the most valuable machine in industry—the human being—must be stopped.

Crane Safety Devices

By Nicholas Prakken

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PRESENT day methods of production make a heavy demand upon the electric overhead traveling crane, electric overhead transfer crane and the electric cage or floor controlled monorail hoists to perform their part. Without this general class of requirement progress would be at a standstill, for hoisting equipment is most universally used in one form or the other in all industries. There are as many different types of cranes and hoists today as there are different kinds of service that demand them. This paper will be confined to the class of cranes that is used in the foundries, machine shops, yards, shipways and warehouses.

Electric cage controlled monorail hoists are oftentimes used in connection with transfer bridges, in the same capacity as cranes, with the added flexibility that they can leave the bridge and travel to remote points on permanent overhead I-beams, either to pick up a load or to deliver one. Electric floor controlled hoists have the same flexibility but are limited in speed to the distance a man can cover in walking. With the electric cage of floor controlled monorail hoists accessories are available for flexibility of operation, such as switches and turn tables. These accessories incorporated in a system with curves makes it possible to give service to the different parts of a plant

The standard electric overhead traveling crane is the most serviceable of all. The girders span from wall to wall and the entire crane usually runs the entire length of the building, passing over workmen with its burden.

The crane is composed of 3 units: bridge, trolley and cage. Each one of these may be again divided:

THE BRIDGE

The bridge is composed of truck ends, girders, bridge machinery, foot walks and electrical equipment. The safety features that safeguard the workmen are naturally a part of the design. The first essential is liberal strength in the properly proportioned parts of every unit piece in the crane.

The truck ends must carry the total weight of the girders, trolley and load. The truck ends in a well designed crane are usually of a box section with cast steel truck housings securely riveted in between the channels forming the side members of the truck ends. It is in the truck ends that the safety features are found. Rail chocks are provided on this steel housing that project one inch or more below the top of the runway rail. The rail chock prevents the truck end from leaving the runway in case of a wheel breaking. Then the truck ends are provided with rail fenders made of steel plate that fit over the rail. Their function is to brush a workman's hand off the rail. Spring bumpers are likewise attached to the top of the cast steel truck housing to prevent the wheels of two cranes on the same runway from running into each other. The M. C. B. bearing is used almost universally. In this bearing the wheel is keyed to the pin and the pin revolves in bronze journals on both sides that are most accessible and readily renewed.

Girders, depending upon the span and capacity of the crane, are either I-beam, I-beam and channel, web girder, lattice box or box girder. The girders most used are the I-beam and channel and the box. The I-beam and channel girder is used on medium span and capacities up to 15 tons. The box girder is usually built up to about 125-foot span and any reasonable capacity. The girders should be strong enough to prevent undue lateral deflection. The greatest load will be imposed upon the girder that has the bridge machinery and foot walk mounted on it. The safety feature in the girder mounting is the coping of the girder around the box section of the

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truck ends, securely fastening the two together by top angles, vertical shear angles and bottom cover plates. Many cranes are assembled by merely bolting the girders to the tops of the truck ends. This method permits the trucks to rock if a bolt becomes loosened. With the girders coped into the truck ends, the bridge becomes an entirely structural unit.

The addition of the motor bracket with the motor, the entirely enclosed bridge motor drive gear case and the gears, the bridge machinery and foot walk produce a torsional strain in the girder. The girder can carry this load more safely when coped into the truck ends than if set on top. The safety features in the foot walk are good strong angle iron hand rails, and the running of the floor boards solid to girder, with a 6-inch angle iron bordering the foot walk so no tools or parts can be kicked off. Oftentimes foot walks are provided on both girders of the crane. It is advisable, but not necessary unless the trolley is of such a design that an extra foot walk is imperative.

THE TROLLEY

The component parts of the trolley are: Trolley sides, girts, gears and gear cases, drums and electrical equipment.

The trolley sides are preferably of box section and provided with M. C. B. trucks and rail chocks. The rail chocks function in the same manner as those on the truck ends of the bridge. The structural girts are bolted in between the trolley sides. On the trolley sides and girts are placed the motors, totally enclosed gear cases and gears, equalizing sheaves and the limit switch. The greatest safety features on the trolley are the total enclosing gears and the limit switch.

The safest type of upper limit switch is the one that opens the hoisting motor circuit through a relay. This switch consists of a weight, a cable, a weighted sheave and a connection box. The weighted sheaves shaft has mounted on it an insulated arm that closes the relay circuit by the weight attached to the cable. Fastened to the suspended weight is a loop that one of the hoisting cables passes through. Irrespective of the swinging of the load, the load block in its upper travel will carry the suspended weight upwards, allowing the weighted sheaves to open the relay circuit, thus opening the motor circuit and bringing the motor to rest.

THE CAGE

The cage contains the controllers, grids, switchboard and foot levers to stop the bridge.

Controllers are either crank, radial arm or lever control. Preference is usually given to either the crank or lever control. With the crank control the controllers are mounted in the front of the cage similar to the standard street car controller. In lever control, the controllers are placed at the rear of the cage in a cabinet and connected to the lever stand by bell cranks and rods. The direction the lever is moved in usually indicates the direction of motion. A notch in the lever stand tells the operator when he has his controller in the off position.

A safe new location has been found for the grid resistances. They are mounted on a sub-floor underneath the floor of the cage. The floor of the cage is provided with trapdoors so the grid units can be inspected. The sub-floor is a more convenient place to mount the grid resistance units than the foot walk, and in addition it eliminates considerable extra conduit and wiring.

The switchboard is located at the back of the cage in a closed cabinet. For inspection or repairs the doors can be opened and by virtue of the enclosing no casualties can arise.

In the cage is located likewise the foot lever. For inside cranes the bridge momentum is arrested by pressing the foot on the foot lever. In outside cages the brake is normally on and it is released by the operator's foot when he wishes to travel.

On outside cranes, a runway lock is employed in the form of a curved arm that falls over a structural member bolted or riveted to the end of the crane runway. This lock will hold the crane accurately to the runway in case of a heavy wind.

MAINTENANCE SAFETY DEVICES

Many different methods are used to keep the crane out of service during repairs. Oftentimes one or more maintenance men are busy repairing different parts of the crane. When this is the case, one side of the main line circuit has 3 sockets with plugs. To complete the circuit all 3 plugs must be in. Each one of the repairmen working on the crane keeps the plug in his pocket until his task is completed. When all 3 repairmen have finished, the 3 plugs will be in their respective sockets.

Another method is to place the main line switch in a box and keep it locked. In case of a temporary breakdown the maintenance man unlocks the main line switch cabinet, opens the switch and again locks the cabinet. As soon as the repairs have been made, the cabinet is unlocked, switch closed and the cabinet is locked again. The crane is now ready for operation.

The ease with which repairmen can move about the crane is another item of safety. The ladder reaching from the cage to the foot walk should be so located that the floor of the cage is always beneath him. This is not always possible where building clearance demands a limited space for a cage.

TRANSFER CRANES

The bridge of the transfer crane, so far as safety features are concerned, is the same as the standard overhead electric crane. Instead of the trolley running on the top of two girders, the cage or floor controlled monorail electric hoist runs on the lower flange of an I-beam, securely fastened to the box girder of the bridge and forming a part of the girder. This crane functions industrially by having the beam registering with a stationary I-beam of the same size and on the same level, so the monorial hoist can leave the bridge and travel with its burden over the I-beam track, including switches, to its destination. Provision must be made in the registering so that the beam will be in perfect alignment with the spur beam when it is desired to run off, and likewise the ends of the transfer crane beam must be baffled so the monorail hoist can not run off the ends when not registered with a spur beam.

This baffling is usually accomplished by a baffle that is raised when the locking to the spur beam takes place. In case there are a series of bays in the shop and in each bay a transfer crane connected by short spurs to the adjacent bays, both ends of the spurs as well as the ends of the beams of the cranes must have interlocking baffles operated from the cage of the monorail hoist. This is necessary to insure perfect alignment of both cranes, so the monorail hoist can travel safely from one crane to the other.

When either 2 or 3-way switches are incorporated in the runway system, the spurs as well as the tongue of the switch must be baffled, for it is very readily seen that in case a switch is partly thrown and not correctly registered, the monorail could run off the tongue between the spur beam connecting with the switch. These baffles are either of the type that drops over the sides of the I-beams or that interlocks into the web of the spur beam and the tongue of the switch. If the dropping type of baffle becomes bent, the monorail hoist can run underneath the baffle and off the beam so baffled; but in the interlocking type, a sufficient momentum must be obtained actually to shear several square webs of cast steel.

PREVENTING HOISTS FROM FALLING

In the past, cage controlled monorail hoists have fallen from their runways when the king pins broke. Two very good methods are employed today to prevent the falling. One type is a cast steel collar, fastening the hoist and trolley together, and the other method is a safety catch of cast steel that fits around the lower flange of the monorail I-beam, but always with sufficient clearance so that it offers no friction to impede the travel of the monorail. The safety catch type is kept clear of the flanges of the I-beam on curves by links attached to the trucks, which always keeps the safety catch central with the I-beams.

Where the transfer cranes are floor controlled, the registering and locking

is done by means of pendant ropes. The controllers then must be spring return, so that the compression of the springs will return the controllers to the off position when the operator releases his hold on the ropes, in case he trips himself over an object on the floor or falls.

In all transfer cranes, to hold them securely in place while at rest, the motor driving the bridge must be equipped with a strong magnetic brake. This brake is only off while the crane is underway and always on while the crane is at rest.

Good judgment and care exercised on the part of the operators and repairmen is the greatest preventive against accidents, but the above safety devices have proven themselves indispensable and are being furnished as standards by most of the crane building fraternity today.

Health Service in Industry

IT has proved so satisfactory in the experience of American manufacturers that, where installed and conducted in an intelligent manner, it has become an integral part of the industrial organization, according to a report by the National Industrial Conference Board. A study recently undertaken by the board in co-operation with the Conference Board of Physicians in Industry shows that, while introduced primarily to care for industrial accidents, the work has broadened until it now embraces fields usually thought far removed from that of medicine, but which have been found to be closely allied with it from an industrial point of view. It has been found, the report says, that the best working conditions produced the least sickness among employes and the smallest loss of working time due to accidents, and that where conditions inimical to the health of the workers are removed, the general physical and mental health has benefited, resulting in turn in increased production and lessened labor turnover. In other words, manufacturers' experience has been that proper health supervision of workers pays in terms of the return upon the investment, besides satisfying a humanitarian instinct.

RULES OF PLANT MEDICAL PRACTICE

The physicians' board, after thorough discussion of individual experiences and investigations in its field, has developed certain uniform rules of plant medical practice, standardized methods of first-aid treatment, standards of equipment for first-aid rooms and contents of first-aid outfits ,and uniform methods of physical examination and record keeping in industrial medical departments.

As a result of the studies made by the Board of Physicians in Industry it has been found that industrial medical work is rapidly developing a group of physicians capable of adapting themselves to new conceptions of the relation of the medical profession to the community and whose work today touches all departments and all activities of the industrial organization. In hand with their curative and preventive activities goes the desire to see that only men and women who are physically qualified for the work they seek are placed in that work through physical examination of workers and of applicants before accepting them for employment.

ONE OF THE BALANCE WHEELS IN INDUSTRY

In order to place workers in their proper employment from the standpoint of physical fitness, the industrial physician today finds it necessary to familiarize himself with the various plant processes and operations. This leads him into close association with the operating officials, the superintendents, and the foremen, and enables him to see the problems of plant administration from their side as well as from the side of the worker. The industrial physician thus becomes one of the balance wheels in the field of industrial relations.

Civil Vs. Military Impairments

OF a total 5,719,152 physical examinations made under the Selective Service Act during 1917 and 1918, 1,532,867 candidates were rejected as physically unfit. This is a proportion of over one-fourth.

Of the rejections from February 10 to October 15, 1918, 63.02 per cent were caused by these disqualifications, in the order named: (1) diseases of the heart and blood vessels; (2) bone and joint defects; (3) eye defects; (4) tuberculosis of the lungs; (5) developmental defects, *e. g.*, height, weight, and chest measure; (6) hernia; (7) flat foot. Not all of these are as serious in civil employments as in military service, but all curtail the worker's productive power, except (5), which in some civilian employments may be a positive advantage and even a prerequisite instead of a disqualification, as in the vocation of a jockey.

A heart lesion that absolutely disqualifies a man for the strenuous life of a soldier may not be incapacitating in a sedentary pursuit like that of a compositor or tailor.

Of the 301,146 flat-footed white registrants, 27,801 (about 1 per cent of the men examined) were held to be incapable of military service; and it is probable that in civil employments the proportion of those who are disqualified for useful vocations by the same cause may not be any greater. Yet in industrial life this defect seriously curtails the worker's productivity. Blacksmiths, carpenters, floorwalkers, messengers, letter carriers, and men of other ambulatory trades who have flat feet suffer acutely from the infirmity and fall short of the maximum of efficiency. Fortunately the deformity is generally amenable to corrective treatment; and, better still, the wearing of properly-constructed shoes avails to prevent the malformation.

Bone and joint defects (ununited fractures, locked knee or elbow joints, etc.), reported as very common, often limit the earning and productive capacity of the workman in the constructive occupations as much as they restrict the destructive capabilities of the soldier similarly crippled.

Eye defects are not incapacitating in civil life to the same extent as in the military service. Proper lenses may be worn by a seamstress, a student, or a proof reader to correct the faults of vision; but a soldier requiring spectacles would become helpless and a menace to his comrades if his glasses were lost or broken.

Tuberculosis of the lungs is responsible for much of the incapacity encountered in industrial occupations. It is an indoor infection, and in dusty trades the death rate from this disease exceeds that of any other cause of mortality. Under equal conditions, the infection is more formidable in civilian than in military life.

To Overcome Printing Dermatosis

SUSPECTING a possible relation between the common dermatosis of printers and pressmen and their use of printing inks, which consist primarily of fine coal dust, the United States Public Health Service recently made a careful study in a printing plant where 35 affected cases and 18 unaffected though equally exposed workers were examined.

The findings are that the cause of dermatosis is rather the improper and too severe method of removing inks than the inks themselves, that dry skins are more susceptible than oily skins, and that healing is delayed more by green and brown inks than by black.

Prophylactic measures recommended are: (1) that lanolin or a mixture of lanolin and olive oil in equal parts be provided, and that before entering the

press rooms, each worker be required to rub lanolin well into the pores of the hands and arms, wiping off the excess with a clean cloth; (2) that at the luncheon period and at night these workers be supplied with a mixture of sawdust moistened with liquid green soap, which, together with warm water, will readily remove the ink without injury to the skin. The men may precede the sawdust and soap with oil supplied by the plant. The foremen in press rooms should be responsible for their helpers' carrying out the preventive measures.

CALAMINE BLOCK PAINT TREATMENT

The most successful treatment found for skin lesions is a calamine paint compound in solid block form, as follows:

Zinc ore (calamine and a silicate of zinc), pulverized and passed through a 100-mesh sieve	3 parts
Gelatine	4 parts
Glycerine	5 parts
Water	6½ parts

These directions are given for using the calamine paint:

"(1) Melt the solid block in the inner pan of a double saucepan, the outer pan of which is filled with water and heated on a fire or gas stove.

"(2) When completely melted, stir with a stiff-bristled, common paint brush. If the paint is too stiff, as it frequently is, add a little hot water until the proper consistency is obtained. This should be about that of a thick sauce or sticking paste. If too much water should be added in doing this, the excess can soon be eliminated by prolonged heating or by adding more of the solid block.

"(3) Paint over the part afflicted with a single thin layer of paint, and before it has set tap lightly all over with a piece of absorbent wool, so as to form a kind of feltwork with the paint.

"(4) Allow it to set completely before putting any clothes over it.

"(5) Leave it on until it begins to come loose; then peel off and apply more in the same manner.

CAUTION

"N. B.—If the patient complains of its being too hot when applied, it is probably because too much is taken up in the brush at a time; this is easily obviated by emptying the brush on the side of the pan before applying the paint."

The study is reported in full in Public Health Reports, May 6, 1921.

Drying As An Air Conditioning Problem

A. W. LISSAUER, speaking before the Cleveland meeting of the American Society of Heating and Ventilating Engineers, June 15, 1921, remarked that the drying art is unfortunately in the class of the jack-of-all-trades, while air conditioning has always received the consideration it deserves as a science. Yet, Mr. Lissauer said, the two arts are the same, and "the laws of air conditioning are those of drying."

CASE-HARDENING DIFFICULTY

The main difficulty in drying has been to secure a rapid drying rate without encountering the case-hardening factor. This problem could be solved by supplying the heat to raise both the surface and interior temperatures of the solid in such a way as not to affect the condition of the air which absorbs the moisture.

APPLICATION OF RADIANT HEAT

An experiment of Mr. Lissauer's company toward this end has been the application of radiant heat. The means of applying heat used so far in the experiment have been Vento sections, wall radiators and pipe coils.

Products dried satisfactorily by radiant heat in reduced periods include potatoes in slices, other vegetables, split salt mackerel and fruits.

Safety News and Comment

Pennsylvania Industrial Conference

IT has been decided by the Department of Labor and Industry of the State of Pennsylvania that an Industrial Relations Conference will be held on October 25, 26 and 27. This conference will have the scope of the Safety Congress of last year, and there will be an endeavor to touch on other timely subjects relative to Industrial Relations. An exhibition similar to the one held last year will be given under the supervision of John S. Spicer. Fuller information regarding the conference will be published in a later issue.

Boston Congress Exhibit

THE latest report of the work in connection with the commercial exhibit at the National Safety Congress in Boston indicates an effort to put on a small show limited to about 25 exhibitors. A room of about 3,600 sq. ft. in area can be secured in the immediate vicinity of the State House. A meeting was called for June 27 in Cleveland to discuss the advisability of these plans.

It would seem that an exhibit of this size would so inadequately represent the development of safety appliances, devices and materials that it would only appear an anti-climax to the big shows of the past two years. While labeled "National," the show would be far inferior to several of the State shows which are held.

Foundry Safety Code Revised

THE Foundry Safety Code formulated by a joint committee of the National Founders Association and the American Foundryman's Association has been issued in a revised reprint by the former association, under date of May, 1921.

The safety regulations cover entrances, floors and galleries, gangways, aisles, equipment, finishing and cleaning operations, protective devices to be worn by employes, lighting, heating, ventilation, women employes, safeguards, sanitary and first-aid equipment, and suspension of regulations by State authority. Recommendations are made for the formation of safety committees, the use of educational methods, including bulletin boards, motion pictures, safety meetings and suggestion boxes, and the provision of specified first-aid kits and an employes' lunchroom.

Post Office Welfare Service

THE United States Post Office Department has inaugurated a welfare service, under the direction of Dr. Lee K. Frankel of New York City. Dr. Frankel went to Washington June 27 to undertake his new duties, in which he is to serve as a volunteer for an indefinite period.

Dr. Frankel's record for welfare organization work is based on his service to the Metropolitan Life Insurance Company of New York, of which he is a vice-president.

Worcester Building Code Revised

WORCESTER, Mass., is one of the latest among revisers of city building codes. For years the Worcester code prohibited masonry walls less than 13 inches thick in residential buildings. The Bricklayers, Masons and Plasterers International Union Local was instrumental in securing the passage by the city council in May of the following amended section permitting the use of 8-inch construction:

SECTION 4. A private dwelling for not more than two families may have external walls of brick or terra cotta wall tile of a minimum thickness of eight inches above the basement, provided, however, that no such wall shall exceed twenty feet in height, nor be more than twenty-five feet in height, measured to the centre height of any gable. These measurements to be taken from the top of the first story

floor joists. Such walls shall not exceed fifty feet in length without cross walls, proper piers or buttresses reinforcing the wall. No floor or roof span shall exceed twenty-six feet between bearings. The aggregate area of all openings in any such wall shall not exceed one-third of its superficial area.

Organizations which aided in advising on the type of construction in question included the American Face Brick Association, the Common Brick Manufacturers' Association, the Hollow Building Tile Association and the National Fireproofing Company.

First-Aid on Telephone Pole

THE Pacific Gas and Electric Company reports a recent instance in which lineman Harold Anderson by prompt application of first-aid methods saved the life of another lineman who accidentally came in contact with a 2,300-volt circuit on top of a pole. As the pole was surrounded by trees, it was impossible for Anderson to carry the unconscious injured man down, and he worked over him until he revived far enough to climb down himself.

Fatigue Result of Seating

A STUDY of industrial seating by the New York Bureau of Women in Industry has recently been published by the State Industrial Commission. After consulting Federal and State Labor Departments, employers' associations, trade unions, health and safety organizations, physicians, safety engineers, foremen, workers and employers, on seating as a factor in fatigue and production, the Bureau reports its conclusions as follows:

1. *That posture must be varied.*

Continuous sitting and continuous standing are both harmful. Ideally, conditions should allow the worker to vary his position at will, because of the rest and the enormous saving of energy that comes from a change of position during working hours.

2. *That work conditions should be such that correct posture is possible.*

a. By providing a physiologically good chair.

b. By insuring a proper relationship of the different parts of the work place.

There is no one chair that is best for all industrial processes. To determine what chair is best for a particular process, the nature of the work to be done, the position of supplies and finished work, the equipment at hand, i.e., the height of bench, chair, place for foot rest, etc., as well as the height of the individual worker—all these must be considered. To provide a good chair is not enough; the important thing is to bring all parts of the work place into the best possible relationship.

Disability Fund Analysis

THE New York State Department of Labor issued in April a Special Bulletin (No. 105) on the subject of plant disability funds. The material was compiled and prepared by Charles M. Mills, Industrial Counselor in the Bureau of Mediation and Arbitration, from an analysis for the period including November, 1920, and February, 1921, of the organization and methods of 41 funds representing in their distribution 34 different industries, as follows: Abrasives, automobile hardware, brass, building construction, chain, cigar, crane, department store, dry dock, electrical manufacture (2), electric railways (2), farm machinery (3), flour, furniture, gas and electric, laundry machine, linotype, mattress, meat packing, office supply, paper box, paper felts, pencil, power plant, rubber, shoe, silk, soap (2), soda products, steam railway, steel (2), tools (2), valves, and wall paper.

Twenty-five associations managed jointly by employer and employes, and sixteen supported solely by employes were analyzed. No plans supported or administered solely by management have been included.

Of the funds studied, 51 per cent were for sickness, accident and death benefits. The benefits for sickness and accident averaged $7.94 in 85 per cent of the funds. The average death benefit was $98.

Kentucky Mine Fatalities

THERE were 120 mine fatalities in Kentucky in 1920, compared with 84 in 1919, according to statistics published by the Bureau of Mines.

Sixty-seven, or 55.83⅓% of last year's accidental deaths, were caused by falling of roof, and 18 by mine cars and locomotives.

Never an Accident in This School

ON a very busy corner at Lloyd and Twelfth streets, Milwaukee, is a public school where there has never been an accident. The following poem is by Mr. J. A. Diederichsen, the principal of that school, and one of the oldest public school principals in Milwaukee.

SAFETY

I'm but a child, and go to school,
And I have learned the Safety Rule;
And when I start away from home,
I don't permit my eyes to roam.

I keep them peeled, that I may see
The dangers that are threatening me.
When at the crossing I do land,
I look about, and listen, stand.

And if I see my way is clear,
And find no danger lurking near
From street car, auto, or a horse,
I quickly start and run across.

I do not play with empty gun,
And point it at my friend for fun;
It may go off, I've heard it said
That in this way some were shot dead.

I must not seek the leafy bower
Of a high tree in thunder shower.
For better far 'twould be to hike
Lest lightning this same tree might strike.

I've learned I must not play with fire,
Nor sharp and dangerous tools desire;
We hear of some one hurt each day,
"It was an accident," they say.

As long as people's acts are rash,
They must expect to meet a crash;
If accidents we would avert
We must be careful and alert.

When once we start a chance to take,
And say, "I'll do it, make or break,"
We must not shout or make a fuss
If good luck will not smile on us.

When running sixty miles an hour,
To test the auto's speed and power,
The open throttle makes it hurtle,
And often turns the auto turtle.

And let me say this, while I write,
A thousand cases I might cite
Of people killed, and wounded, maimed,
For which they only can be blamed.
They heeded not the Safety Rules,
And met the common fate of fools.

In spite of all the warnings read,
And when the last word has been said,
We can't entirely do away
With accidents by night or day.

Of course we can't eliminate
The ever working hand of fate,
But we can learn how with due care,
The accidents will grow more rare.

Let all the teachers do their part,
Impress upon the mind and heart
The thoughts and actions that will tend
Toward Safety now, and till the end.

Oregon to Teach Safety in Schools

IN Oregon, in 1920, there were 10,038 traffic accidents, according to Hugh H. Herdman, general manager of the Oregon and Columbia Basin Division, National Safety Council, quoted in "The Survey," May 28, 1921.

Industrial accidents keep pace with those of traffic, yet the main thing we are doing about both kinds is to see that they are paid for, rather than prevented. To prevent accidents is regarded as a fundamental educational problem in Oregon, and State Superintendent of Schools Churchill has decided on a course of study extending through the first to eighth grades which will combine safety with civics. "In co-ordinating safety education with civics, we secure a recognition of the undoubted fact that safety is not a fad but a social obligation. It is no longer a personal matter, but a part of good citizenship.

"The course has been prepared largely by a committee of five, chosen from among the best teachers in the state. The work is constructive, positive. It seeks to develop in the child, not inhibitions, but right habits of thought and action. The emphasis is placed on the positive rather than on the negative—on safety for the child rather than on safety from accidents."

Car-Pushing Causes Mine Accidents

POWERS HAPGOOD, writing for *The Survey*, June 4, 1921, describes several cases of grievance on the part of soft coal miners in Pennsylvania against the prevailing practice of requiring the mine-workers to push the cars from the electric haulage ways to the rooms where the coal is loaded.

At the last district convention of United Mine Workers District No. 2, John Brody, district president, advocated the publication of a pamphlet on "Car-Pushing and How to Cure It." This pamphlet is now in process of preparation, and is to be used by the union in making its next scale agreement with the mine operators.

In one day's interviews Mr. Hapgood says that he found 16 cases, including 3 deaths, where serious injuries were caused by car-pushing.

There are in particular three classes of grievances which the miners have against car-pushing: (1) That it produces bodily injuries, wears down the men's health and strength; (2) prevents older men who

are capable of being good miners except for car-pushing from engaging in underground work, and (3) the loss of time and money which the present system of handling cars causes. Three cases of death from car-pushing were obtained, but because the information in these cases could not be obtained first hand, we have not reproduced them here.

Of 40 cases which are being used as evidence of malpractice by the miners' pamphlet, 18 show the daily wear and tear on the miners, 17 show actual injury, and 3 are death cases, while 2 are estimates of the amount of money that miners could earn if it were not for car-pushing. The estimate of increased earnings varies from $2.50 to $5.50 more a day.

Air Dust-Content Analysis

A METHOD for determining the finer particles in the air, such as smoke particles, and for rating the efficiency of air-filtering devices in ventilating systems is presented by Dr. A. L. Meyer in *The Journal of Industrial Hygiene,* June, 1921. The method is based on enumerating by oblique illumination the particles in a sample of air brought into aqueous suspension by shaking the sample with water.

After a thorough mixture is effected in a Luer syringe the particles are counted in a Levy blood counter which has been meticulously cleaned of dust particles, as "a surface sufficiently clean for ordinary illumination will not do at all for oblique illumination." The particles are allowed to settle before the count is made, and then the entire number in two fields, each a square millimeter divided into 16 smaller areas, is counted; an average of these two counts is used in the calculation, which was in this experiment modified by complications based on the same principle.

Before the method was actually tested, it seemed doubtful whether it would produce consistent results, partly because of the possibility of the inclusion of particles between the barrel and piston of the syringe and partly because of the exposure of the piston to the dust particles of the air. But experience showed that these factors, if they operate, do not endanger the usefulness of the method. In the modified form of the method any error from this source disappears.

The same objection applies to this method as to all other methods in which water is used as a medium: water-soluble particles will not be included in the count. In many cases, however, particles lost in solution may be determined by chemical methods.

Acetylene Generator Installation

THE Industrial Commission of Wisconsin has issued a circular urging the necessity of installing acetylene gas generators in outbuildings rather than in the basements of residences. The outside building for such installation should be specially constructed for the purpose, and well ventilated. "It is clear that faulty installation, failure of all parts of the generator to properly function, and careless management may cause leaks at any time and an explosion must result from any light, flame or even a spark."

Kingsbury Organizes Company

ANNOUNCEMENT has been made of the organization of the Standard Safety Equipment Company to manufacture and distribute standard safety equipment and supplies. Offices have been taken at 168 North Michigan avenue, Chicago. The president is Mr. C. A. Kingsbury, who needs no introduction to the safety field. The treasurer is Mr. F. L. Hurlbutt, formerly with the DuPont interests, and Mr. L. E. Dickson as secretary. Mr. A. U. Barnes will be Eastern manager. He is well known in New York and vicinity.

Safety for Concrete Houses

A COMMITTEE on monolithic concrete houses, reporting to the recent National Conference on Concrete House Construction, made the following reference to safety against fire: "Complete fire-safeness requires concrete floors, partitions and

an incombustible roof. Concrete floors should preferably be covered with rugs, carpets, linoleum or special floor coverings that may be easily removed."

Fire Limits Extended in Tulsa

TULSA, Okla., has passed an ordinance extending the city fire limits to include a large portion of "Little Africa," the outlying negro district which was recently devastated by fire. West Tulsa has also had its fire limits changed. This means only fire-resistive building in a large area, and was supported by the Real Estate Exchange.

State Has 2,700 Fatal Accidents

A "NO-ACCIDENT week in every factory in Massachusetts" is one way by which the recently organized Massachusetts Safety Council is going after the problems accountable for the 2,700 deaths that occurred from accidental causes in 1920.

The cost of accidents in Massachusetts in 1920, covered by compensation and other insurance, was $25,000,000.

Nobody has yet computed the cost to the uninsured. Nearly three accidental deaths occur outside of industry to one in. No organized safety work has been done, except in those cities where the school authorities have undertaken it recently among the children, outside of industrial establishments.

Explosive Pressures of Dust

THAT dust explosions in industrial plants in 1920 were responsible for nearly 100 fatal accidents and a larger number of other injuries, besides a property loss of over $7,000,000 is the indictment against them by the Allen & Billmyre Company, engineers, in a statement on the explosive pressures of various kinds of dust.

There are two engineering problems involved by the explosive nature of dust: (1) Dust Collecting is the handling of suspended or floating dust and is really ventilation; (2) Dust Removal has to do with static or settled dust and is an entirely separate and highly specialized branch of engineering.

The explosive pressure of various kinds of dust is given in the following table:

	Kind of Dust.	Pressure generated. (Lbs. per Sq. In.)
1.	Stinking smut of wheat	15.9
2.	Dextrin dust from dextrin kiln	14.6
3.	Powdered wheat starch	14.0
4.	Starch dust (corn) from dry starch	13.8
5.	Tan bark dust (200 mesh)	13.3
6.	Wheat elevator dust (side walls)	13.0
7.	Wood dust, from chipper room	12.8
8.	Oat and corn dust	13.6
9.	Sugar (lump pulverized to pass 200 mesh)	12.2
10.	Feed dust from dust collector	11.8
11.	Potato flour	11.7
12.	Wheat flour, from packing room	11.2
13.	Malt dust	10.6
14.	Fertilizer dust	10.5
15.	Tapioca flour	10.4
16.	Pittsburgh standard coal dust	10.1
17.	Cocoa dust from cocoa bolters	9.9
18.	Sulphur dust (extra fine)	8.8
19.	Cork dust (ground)	7.4
20.	Rice flour	5.6

If a sack of flour should suddenly be thrown into suspension, diffused with the right proportions of air, and subject to favorable conditions, the explosive pressure generated would lift 2,500 tons 100 feet.

C. L. Colburn Represents Mine Safety

C. L. COLBURN, who has been for the past two years assistant chief mining engineer of the Bureau of Mines, has been given the duty of visiting the various coal and metal mines of the country to acquaint the operating companies with the technical safety service available to them through co-operation between the Bureau of Mines and the National Safety Council. Mr. Colburn's work will be under the general direction of the chairman of the mining section of the National Safety Council.

Personnel Research Exchange

THE personal element in industry, which is such a large factor in all advancement of safety practice, is now to be the object of an exchange of research information, for which the Personnel Re-

search Federation was recently organized in Washington, D. C.

This is credited by the United States Bureau of Labor Statistics with being "the first co-operative effort to bring about an exchange of research information regarding the personal element in industry." It was formed under the joint auspices of the National Research Council and the Engineering Foundation, and its membership already includes scientific, engineering, labor, management and educational units. Its aim is "*the promotion of increased efficiency of all the personnel elements of industry from employers and management to unskilled labor, through a study of improved* SAFETY, *health, comfort and relationships.*" (The italics belong to SAFETY ENGINEERING.)

A report prepared in the United States Bureau of Labor Statistics showed 250 organizations doing personnel research work. This indicates the first task of the federation: "To ascertain what organizations are studying the various problems and to what extent, and to determine the advisability of harmonizing these independent efforts with a view to reducing duplication, considering neglected phases of the question, and advancing work already begun."

The general plan is for the federation to be a clearing house for existing research agencies rather than an additional agency of this kind. The ultimate aims and scope of the work are set forth as follows:

1. Collection and dissemination of information through:

(*a*) Registration of researches contemplated, in progress, or completed.

(*b*) Collection of research information.

(*c*) Cataloguing and analyzing the research information.

(*d*) Collecting and analyzing of methods of instruction and training for personnel work.

(*e*) Publication.

(*f*) Publicity.

(*g*) Consultation and advice, when requested.

2. Stimulation and initiation of research through individuals, organizations and governmental agencies, by:

(*a*) Publicity and correspondence.

(*b*) Personal contact with research agencies.

(*c*) Advice and encouragement in the formation of necessary new agencies.

(*d*) Aiding governmental agencies to secure appropriations necessary for them adequately to carry on personnel and employment work.

(*e*) Calling special conferences.

(*f*) Definition of problems needing investigation.

Boilers Need Safety Regulation

F. A. PAGE, boiler inspector for the California Industrial Accident Commission, says:

"I am sure that greater consideration would be given to the enactment of boiler inspection laws and safety orders, if the facts concerning them and the reasons for their necessity were properly presented before the various State Legislatures.

"Perhaps, some day the boiler makers will awaken to the realization of the danger menacing the people of the country, through the absence of reliable boiler safety and inspection laws and insufficiency of competent inspectors to enforce those in existence. When they do, let us hope that they will take the right means of bringing about the proper enactment and enforcement of these laws, and in so doing gain the consideration and respect that is due the trade of boiler making."

Bologh Skylight Ventilator

THE manufacturers of the Bologh Skylight & Gravity Ventilator have moved the offices of the company to 200 Fifth avenue, New York, where they will be located in future. SAFETY ENGINEERING hopes to present to its readers in the next issue an illustrated description of this device which is of interest to safety engineers not only for ventilating functions but also for its convenient operation in case of fire.

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

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Regular Meetings—Fourth Friday of Each Month from September to June at 8 P. M. Next Meeting September 23.

PROCEEDINGS OF THE JUNE MEETING

THE regular monthly meeting was held on June 17 in the Engineering Building, New York. It was called to order by President Sanford who stated that as Dr. Risteen of the Travelers Insurance Company was obliged to catch an early train he would ask him to make the first remarks. Dr. Risteen spoke regarding the education of engineers and others in Safety, and thought that the main thing was to start the new generation right. In Detroit Safety education is begun with children in their kindergartens. Dr. Risteen's thesis was that when the rising generation is thoroughly imbued with the idea of Safety, the rest will be easy.

Mr. Sanford then introduced Mr. N. M. DuChemin of the General Electric Company, who read a paper entitled "Education in Safety Engineering as given at the Lynn General Electric Engineering and Apprentice School," to appear in full later. In commenting on this paper, President Sanford told of the effectiveness of the plant organization, and instanced a case where he unexpectedly took a visiting body of Safety men through the plant without any warning; they found in a chipping department 40 chippers of whom 39 were wearing goggles, and the other man hardly in need of them on account of the character of the work was doing.

The next paper was by Miss Lloyd Marshall, member, N. F. P. A., which will be found in full in these pages.

Following Miss Marshall, Mr. J. Albert Robinson, chairman of the Educational Committee, read extracts from a large number of letters received in response to a questionnaire sent out by him as to whether or not a course in Safety Engineering was or was not desirable. There was some difference of opinion but in the main the opinion seemed to be that Safety should be interwoven with all other engineering training.

Mr. Herbert Powell spoke on this subject and thought that Safety Engineering should be intermingled with existing courses.

Dr. M. G. Lloyd, chief of the Safety Section, U. S. Bureau of Standards, thought that the work of the average Safety supervisor was not all engineering in its character, but that the element of salesmanship came into the work, and that the ideal Safety man should have selling ability so as to be able to succeed in introducing his programs. He pointed out the prevailing reluctance on the part of college authorities to increase the number of courses, and suggested that some correspondence school introduce a Safety course. This, it was pointed out, was already done by such a school; and courses in fire prevention are conducted in Chicago, the logical center for such, on account of the Underwriters' Laboratories.

Mr. Sanford asked Mr. Venning for an outline of the standard Safety organization and the type of Safety inspector employed by insurance companies, also what type of inspector the insurance companies recommended in a small plant.

Mr. Venning was of the opinion that a mill-wright made an ideal Safety man, as he possessed the knowledge of construction necessary and was usually of a type to succeed in this work.

Past President Mowery pointed out the advantages of some method of licensing Safety Engineers, arguing that though the automobile may not now be driven by anyone without a license, a Safety Engineer charged with many times the responsibility of an automobile driver may perform his duties without any authentication.

Mr. Sanford suggested that a book on Safety Engineering be compiled by the Educational Committee of the Society; Dr. Lloyd thought that this might be done, the correspondence schools preparing an outline.

Mr. Welch spoke on the future student and thought that a very important point was the man on the job, recommending getting in touch with the labor unions and talking to the delegates as methods whereby the workmen could be impressed with the importance of this work.

Mr. F. V. Clark, referring to Dr. Lloyd's mention of salesmanship, stated that this was the age of the trade-mark and that the authentication of a Safety Engineer meant nothing more than trade-marking him so that a man bearing the title "Safety Engineer," with the name of the college after it, could be accepted at face value the same as a piece of silverware marked "Sterling" and bearing the name of a prominent silversmith.

Mr. James, Safety Engineer of the New Jersey Zinc Company, spoke on the value of Safety appliances, the special designs which he has developed to suit his own needs, the education of employes by signs and bulletin boards, and the plan used in his company for increasing enthusiasm on the subject.

The following resolution was offered: "That the Committee on Education be instructed to prepare and submit to the Executive Board copy for a book containing an outline of lessons in Safety Engineering." The meeting adjourned.

W. E. CRIPPEN,
Publication Committee.

When You Get That Far

It Is Too Late

For Safety Speeches

Don't Get Too Familiar With a Running Belt or Pulley

Courtesy of the Ontario Pulp and Paper Makers Association, Toronto, Canada.

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 469

SAFETY VS. FATIGUE.—Lack of interest or lack of proper attention to work will readily yield to fatigue; if engaged at work which one dislikes, one soon becomes exhausted. Exhaustion may result in a breaking down, for the breaking down process will be in excess of the building up; in other words, it is the anabolic or constructive change in the cells of the body as compared with the catabolic process or the destructive change.

The metabolic change, or the constructive-and-destructive condition of cells is going on all the time, and when one is performing work which is habitually resented, one soon becomes peevish. Peevishness is followed by worry, which is the arch enemy to health, and results in lowered vitality and fatigue, with liability to accidents and decreased efficiency which means an economic loss to the employer.

PLACING OF EMPLOYES

After an applicant has been accepted, the continuous problem remains of keeping him with the firm, due to the fact that through his experience he becomes more efficient.

Care must be exercised in placing the men at work for which they are best qualified and which appeals to them, for a man will not prove an asset to the employer when following an occupation in which he is not interested.

Most men have a certain capacity or talent which can be best applied to a vocation which most nearly meets their desires; they will prove more efficient as they are more properly placed.

The intelligent selection of employes for different positions is of vital importance, and requires fairness, broadmindedness and an understanding of the human element.

FATIGUE AND ACCIDENTS

Investigations have demonstrated that more accidents occur about the middle of the forenoon and about the middle of the afternoon than any other periods of the day, which is due to an amount of worn-out tissues in the body sufficiently large to produce a state of physical fatigue, which in turn produces mental fatigue, and the worker becomes less alert and the muscles are slower in responding to the work to which they are subjected.

A new man should be carefully interviewed, and if he appears to be a slow-thinking man, or one below the average in intelligence, he should not be placed at work which requires a quick-thinking, alert man, for in it he would be very liable to accidents as well as to mental and physical fatigue.

Wednesday has been shown to be the "peak day," for injuries with a gradual increase from Monday to Wednesday, and a slight decline from Wednesday to the end of the week. This variation through the week is worthy of consideration and action. Any method whereby fatigue is reduced improves the worker physically and results in a reduction of injuries and an increase in efficiency.

Fatigue lengthens the time necessary for the worker to perform a given amount of work, which means for the employer a decrease in the amount of work performed and hence in the total output.

❦ ❦ ❦

PROTECTION AND THE EYE.

No. 468 —Of what value to the world is the sightless man?

By the Grace of God, all creatures in the animal kingdom were blessed with the power of vision, and he who has by the carelessness or thoughtlessness of himself or others been deprived of this power has lost that which is more precious than any blessing which can be bestowed by or won from the world of men. A man may lose a hand, an arm or even a leg and still be capable of completing his destiny on earth, but the man who has lost the sight of his eyes has been reduced to the lowest rung of the ladder of life. His value to the world is gone, never to return.

The prevention of a serious accident to the eye is the greatest service that can be rendered, for by such service are eliminated not only pain and suffering but unhappiness and blindness. It should therefore be the first consideration of those interested in safety to devise proper protection for the eyes of all those whose duty in life makes it compulsory for them to labor where the risk is great.

In arriving at a correct solution of the problem, we are confronted with three major issues, namely: (1) What occupations subject the worker to eye accidents? (2) What type of eye protection should be furnished? (3) How can the worker be best induced to use the protection furnished?

A close study of the field of possibilities reveals to us a number of chief causes of eye accidents. Roughly these are:

1. Chipping, calking and hot riveting.
2. Scaling and grinding of metals, stone dressing and sand paper or emery cloth wood dressing.
3. Babbitting, casting of hot metal, dipping in hot metal baths.
4. Handling of acids and caustics.
5. Sand blasting.
6. Glare.
7. Welding, cutting, steel making, brazing.
8. Electric arc welding and cutting.
9. Machining of extremely brittle metals.

There are a number of additional hazards which are peculiar to some special process of manufacture or are beyond the control of any person or group of persons to control. The above list, however, will generally cover the usual hazards met in most industrial plants. Our discussion will therefore be confined to them.

A study of the hazards listed reveals the fact that each has a different method of approach and requires a protector having distinctive features.

1. Chipping, calking and hot riveting are classified as a heavy hazard and protection is needed against relatively large flying objects. This requires a goggles with rigid non-adjustable bridge, or adjustable metallic bridge, with side shields. The glass of the goggles should be able to withstand the blow imparted by a spherical steel ball weighing at least one-half an ounce and dropped from a height of 21 inches at least ten times onto the center of the horizontal outer surface of the lens when held in the frame.

Either a face mask or a helmet can be used for protection against this hazard, providing the lens used will meet the requirements of the goggle lens.

2. Scaling, grinding, etc. The determination of the style or class of goggle advisable for this hazard must be made for each individual case. Generally speaking, any class of goggle can be worn and the lens used need not comply with any special strength test; however, for the grinding of metal, and stone dressing, the lens of the goggle should be strong enough to withstand an ordinary blow such as would be imparted by a small particle of metal flying from an emery wheel. Side shields certainly are advisable where there is likely to be dust or fine particles of sand and metal thrown off, such as from an emery wheel not connected up to a proper exhaust system.

For intermittent grinding of small

tools, such as is done in the average shop where each operator grinds his own tools, goggles are not necessary providing each wheel is equipped with a glass shield rigidly attached to the machine or guard and placed at such an angle as to catch all the particles thrown off by the wheel. (The writer has been experimenting in a machine shop employing over 200 operators for the past 6 months with a shield such as is described above and has reduced all cases from emery wheels from an average over a year's period of 2 a week to none in over 6 months. I would be glad to furnish any additional information to those interested.)

3. Babbitting, casting of hot metal, and dipping in hot metals require protection from splashing and small explosions caused by hot metal coming in contact with steam. Goggles of any style may be used depending upon the particular hazard. Generally speaking, an ordinary light goggle without side lens is all that is required. A face mask of woven wire, vulcanized fiber or some equivalent material may be used with lens of the same quality specified for goggles in use against the same hazard.

4. For the handling of acids, caustics, etc., where protection is needed from fumes, gases and liquids, so-called eyecup goggles, face masks and hoods are recommended.

When goggles are used the eyecups should be of soft pliable rubber or equivalent, non-inflammable material and should conform readily to the contour of the face. The goggle lens need not be of the heavy laminated type.

Face masks shall be of metal, vulcanized rubber, or fiber, and must be so shaped that they will protect the entire face. Hoods generally are only used where a great deal of gas or fumes is given off; when used they should completely cover the head and shoulders and should receive their ventilation from an external source.

5. For sandblasting operations where it is necessary for the operator to be inside the cabinet for operating, a hood which will entirely cover the head and extend down below the neck is the only means of protection recommended. Where the operator can stand outside the cabinet in operating no protection is needed, provided the opening is covered in such a way as to catch the sand as it rebounds. If this is not the case a light goggle with side screens should be used.

6. In all furnace work, heat treatments, etc., there is more or less glare which, according to its intensity, will effect the eyes of the operators. In such cases it is advisable to furnish light goggles with lens of a density and tint to meet the requirements of the case at hand. This can best be determined by the operator himself.

7. In oxy-acetylene welding and furnace work we are confronted with a new condition required of the lens used in the goggle, face mask, helmet or shield used. This new hazard is the pathological effect on the eyes which is produced by the radiant energy from the light source. In addition to this heat or radiant energy we are also confronted with minute particles of molten metal which fly with great velocity. We are therefore confronted with three hazards in one: Protection of the eyes from harmful light rays, protection from heat and potection from flying particles.

The lens of the goggle, shield, helmet or face mask used has been fairly well standardized among manufacturers, and any reputable goggle manufacturer can furnish the proper lens, knowing the conditions under which it is to be used.

Parts of the frame of the protector coming in contact with the flesh should be covered with a heat insulating material to protect against a burn or severe discomfort. In all cases the protector used, of whatever type, must be made of non-corrodible opaque material which will conform to the face and exclude all light except through the lens.

8. In electric arc welding the hazard is the same as for oxy-acetylene welding, but in this case the radiation is so intense that serious burning of the skin as well as injury to the eyes may result from long exposure. For this reason, only the helmet and the shield are recommended as a protection. The material used in the protector must be an insulator for heat and electricity; light should be excluded except through the lens.

9. In machining of hard or brittle metals it is advisable that the operator wear some protection over his eyes, as the chips from the metal are inclined to fly off with enough velocity to severely injure if lodged in the eye. A light weight goggle without side shields is all that is required for this work.

Another method which can be used for some work, especially that on engine lathes and milling machines, is to attach a small glass guard to the tool post and adjust it in such a way as to catch the chips.

The methods in use of inducing operators or workmen to wear goggles are so numerous that they can hardly be handled in a short article. In any case this problem is purely local in character and must be solved by the management of each establishment.

It has not been the intention to cover every possibility for eye accidents in this paper, nor has the subject treated been exhaustively covered. However, the salient points have been fairly well developed, and if some good comes from the article the author will be satisfied.

Award of Prizes for Articles Published in June will appear in the August Number.

Courtesy of F. H. Babcock, Safety Agent, P. & L. E. R. R.

How a Jazz Baby Stubbed Her Toe

By E. S. Edwards

ONCE upon a time a young HALE and HEARTY QUEEN, CORN FED and HUSKY, could STAND THE GAFF no matter how ROUGH, READY and continuous things came HER WAY. She was TOUGHINE, as girls go, no thought of PAINS or PILLS and was PERT and PROUD of it.

She never had occasion to locate a DOCTOR'S SHINGLE.

One of her favorite outdoor STUNTS was to entice some poor unsuspecting CLAM out for a stroll, proceed to walk the HEAD off him and send him home with the knowledge he'd been up against a CHAMP. She could JAZZ and SHIMMY from Early Eve to late morn without the aid of a FAN, while her partners DROPPED away to sit at the SIDE LINES and wonder at her ENDURANCE. Added to all this she PLODDED in a PLANT all day, toiled hard with PEP and PRECISION, and was on the PERSONNEL list as a GOOD WORKER. SHE was a MIRACLE MAID, and apparently had all the retired PUGILISTS' and STRONG MEN'S systems of BODY BUILDING faded to a PALE AND BILIOUS green, and although she was a restless CRITTER, always on the go in HIGH GEAR with the THROTTLE wide open and all the CYLINDERS firing, yet her disposition was all to the MUSTARD, BRIGHT MORNING GLORY at the SHOP and the EVENING STAR at HOME. She was the light and life of ANYTHING DOING, ANYWHERE, ALWAYS.

BUT—the "morning after the night before" of a particularly stirring JAZZY PARTY in a hot room with an open window, our lady woke up with a FROG in her THROAT, A "CRICK" in her BACK and the general feeling of having been KICKED around the BLOCK by an ARMY MULE. She was counting the SPOTS on the ceiling when the MEDICINE MAN floated into her BOUDOIR to give her the ONCE OVER. He decided she had the START of every known ailment from TIC DOULOUREUX to the MUMPS in her system. She had been spoiling for a real case of COLLAPSE for a long time without knowing it and the JOLT in the ribs OLD DAME NATURE gave her was a RED LANTERN swung out on the tracks indicating DANGER AHEAD. She had been HEADED on a SLIPPERY RAIL for the family PLOT on the hill at a rate in excess of the most liberal SPEED LIMIT. His expert ministration, however, put SAND on the IRONS and JAMMED down the brakes to a DEAD STOP. In addition to the DOPE left by the DOC, she got an EARFUL OF COUNSEL FREE, GRATIS, and for nothing. "GO EASY," he said, "SLOW DOWN, eat REAL FOOD at stated FEEDING HOURS, live according to the habits of a NINE O'CLOCK TOWN and report to me regularly for PERSONAL INSPECTION."

MORAL

Tie an INSPECTION TAG on yourself today and BEAT it to the PHYSICAL EXAMINATION DEPARTMENT. It will save you MONEY, A SICKNESS, and perhaps your LIFE.

Nine foolish little workmen,
Knew what they should not do;
One monkeyed with a buzz saw,
And zip! went Number Two.

—Unknown Author

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

CLUBHOUSES, CITY AND COUNTRY

December 10, 1919. Chicago, Ill. Woodlawn Club Building, 6404 Woodlawn avenue. Clubhouse. One 3-story building destroyed. Walls, brick and wood. Floors, wood. Roof, shingle. Cause, overheated furnace. Fire started in basement. Discovered by newsboy at 6.05 a. m. Alarm, telephone. Duration, 4 hours. Stopped when building burned down. Fire was favored by large openings. Firemen handicapped because first alarm companies were at another fire. Private fire apparatus, none. Persons in building, none. Injured 2 (firemen). Means of escape, stairs. Value of building and contents, $80,000. Property loss, $50,000.

December 12, 1919. Salem, Mass. Knights of Columbus Home, 94 Washington square. One 3-story building damaged. Walls, brick. Floors, wood. Roof, slate. Cause, spontaneous combustion. Fire started in second floor front room, probably before 1 a. m. Discovered by neighbor across the street about 4.14 a. m. Alarm, telephone; later, box. Duration, 1¼ hours. Stopped after burning off part of roof. Fire was favored by lack of fire stops to floors. Firemen handicapped by delay in discovery. Private fire apparatus, none. Persons in building, none. Means of escape, 1 stairway from third floor; 2 from second. Value of building and contents and property loss not reported.

December 16, 1919. South Paris, Me. Odd Fellows' Building, Market square, halls and stores. One 3-story building damaged. Walls, wood. Floors, wood. Roof, asbestos shingles. Cause, overheated chimney. Fire started on first floor around chimney. Discovered by man entering office about 5 p. m. Alarm, personal. Duration, 2 hours. Stopped under floor in same building. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, unknown. Killed, none. Injured, none. Value of building and contents and property loss, unknown.

December 18, 1919. Philadelphia, Pa. Twenty-first Ward Republican Club, 4419 Main street. Store and club. One 3-story building partly destroyed. Walls, brick and stone. Floors, wood. Roof, tin. Cause, gas stove. Fire started in store. Discovered at about 2.41 a. m. Alarm, telephone. Duration, 3½ hours. Stopped at second floor. Private fire apparatus, none. Persons in building, none. Means of escape, value of building and contents and property loss not reported to SAFETY ENGINEERING.

January 14, 1920. Farry Sound, Ont. Odd Fellows' Block, James street. Stores, offices and assembly halls. One 2- and one 3-story building damaged. Walls, brick and wood. Floors, hardwood. Roofs, tar and gravel, and shingle. Cause, unknown; electric wiring suspected. Fire started in third floor of main building. Discovered by janitor at about 10 p. m. Alarm, street fire alarm. Duration, 4 hours. Stopped at roof of main building. Fire was favored by getting through ventilator into attic of wooden building in rear. Firemen handicapped by electric lights being out on account of fire; darkness and smoke made it difficult to get close to seat of fire, and it was 25° below zero. Private fire aparatus, none. Persons in building, 1. Killed, none. Injured, none. Means of escape, stairway. Value of building, $30,000; contents, $38,000. Property loss, $6,000.

January 18, 1920. Boston, Mass. Railway Men's Y. M. C. A., 160 Beverly street. Also Boston & Maine R. R. freight offices. One 3½-story building damaged. Walls, wood. Floors, wood. Roof, tar and gravel. Cause, unknown. Fire started at third floor. Discovered by a roomer of Y. M. C. A. at about 9.30 a. m. Alarm, box, after 20 minutes' delay. Duration, about 5 hours. Stopped at first floor. Fire was favored by wooden construction, walls and ceilings sheathed and poor fire stops. Firemen handicapped by fire being at the water's edge, so they had to lay long lines, 800—900 feet; before the department was called a hot air explosion occurred on the second floor. Private fire apparatus, extinguishers and fire pails. Persons in building, about 25. Killed, none. Injured, none. Means of escape, stairway and fire escapes. Value of building and contents, approximately $55,000. Property loss, approximately $38,000. Valuable papers mostly saved.

February 3, 1920. Philadelphia, Pa. Trainer Hall, 2530-2534 North 4th street. Hall and lodge rooms. One 3-story building damaged. Walls, brick. Floors, wood. Roof, tin. Cause, unknown. Fire started in cellar. Discovered by pedestrian at about 5.05 a. m. Alarm, tele-

graph. Duration, 5 hours. Stopped at first floor. Persons in building, none. Means of escape, fire escape. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

February 18, 1920. Sheepshead Bay, N. Y. Sheepshead Bay Club, 3030-3036 Ocean avenue, corner of Jerome. Unoccupied clubhouse, under alteration for prospective tenants. One 2-story building partly destroyed. Walls, wood. Floors, wood. Roof, wood. Cause, unknown (probable carelessness of two workmen). Fire started in southeast corner of first floor. Discovered by neighbor in adjoining house at about 9.42 a. m. Alarm, telegraph. Duration, about 30 minutes. Stopped after partly destroying first floor, second floor, and roof; confined to building. Fire was favored by wooden construction, open stairway through center of building, and concealed spaces. Firemen handicapped by icy condition of streets, which probably delayed second alarm companies. Private fire apparatus, none. Persons in building, 2. Killed, none. Injured, 1 (fireman). Means of escape, stairs, center and rear. Value of building and contents and property loss not reported.

March 1, 1920. Austin, Tex. University of Texas Faculty Clubhouse, 2304 San Antonio street. One 2-story building damaged. Walls, weather board. Floors, wood. Roof, shingle. Cause, unknown. Fire started in roof. Discovered by neighbor at about 10 a. m. Alarm, telephone. Duration, 1 hour. Roof burned and part of second story. Fire was favored by shingle roof and strong wind. Firemen handicapped by light water pressure at hydrant before pumper could be worked. Private fire apparatus, none. Persons in building, about 6. Killed, none. Injured, none. Means of escape, stairway. Value of building and contents, $15,000. Property loss, $8,000.

March 3, 1920. Reading, Pa. Marion Fire Company clubhouse, 1217 Moss street. Home for members. One 4-story building damaged. Walls, brick and stone. Floors, wood. Roof, tin. Cause, electric wiring. Fire started in basement. Discovered by officer. Alarm, fire alarm station. Duration, 1 hour. Stopped at second floor. Fire was retarded by construction of building. Private fire apparatus, none. Persons in building, none. Means of escape, fire escapes and exits. Value of building and contents, $25,000. Property loss, $10,000.

March 12, 1920. New Bedford, Mass. Elks' Home, School and Sixth streets. One 3-story building damaged. Walls, brick. Floors, wood. Roof, slate. Cause, unknown. Fire started in cellar. Discovered by watchman at about 1.31 a. m. Alarm, telephone. Duration, 45 minutes. Stopped at third floor. Fire was favored by small fire working up through partitions. Private fire apparatus, none. Persons in building, none. Means of escape, good. Value of building and contents, $60,000. Property loss, $300-$400.

March 21, 1920. Olanta, S. C. Masonic Building and 2 homes, west side of Main street. One 1- and two 2-story buildings destroyed. Walls, wood boards. Floors, wood. Roofs, shingle. Cause, unknown. Discovered by inmates of house at about 9. No fire department in town. Duration, about 2 hours. Stopped after burning all near enough to catch fire. Fire was favored by dry wood of buildings. Private fire apparatus, none. Practically all the citizens of the town were there and helped. Persons in buildings, 14 or 15. Killed, none. Injured, none. Means of escape, doors and windows. Value of buildings and contents, about $15,000. Property loss, about $12,500.

August 3, 1920. Norfolk, Va. United States Army Supply Base, Bridge and B streets. Service club and mess hall. One 1- and one 2-story building damaged. Walls, beaver board. Floors, wood. Roofs, tar paper. Cause, obscure. Fire started left center of club building. Discovered at about 2.20 a. m. Alarm box. Duration, about 1⅓ hours. Stopped at second building. Fire was favored by easily burning construction. Firemen handicapped by tardiness in turning in alarm. Private fire apparatus, 3 government apparatus. Persons in buildings, none. Means of escape, side doors. Value of buildings and contents, $6,500. Property loss, $6,500.

February 19, 1920. Akron, O. Portage Cuuntry Club, N. Portage path. One 2½-story building destroyed. Walls, wood. Floors, wood. Roof, shingle. Cause, boiler. Fire started in boiler room. Discovered by manager of building at about 4.15 a. m. Alarm, telephone. Duration, 3½ hours. Confined to building. Fire was favored by construction of building. Firemen handicapped by being unable to shut off gas. Private fire apparatus, none. Persons in building, 7. Killed, none. Injured, none. Value of building and contents, $145,000. Property loss, $76,000.

THEATERS AND AMUSEMENT PLACES

September 22, 1919. Lewiston, Ida. Woodman Building, 9th and Ida streets. Lodge and dance hall; ground floor used as bottling works. One 2-story building damaged. Walls, brick. Floors, wood. Roof, shingle. Fire started on second floor. Discovered by passerby two blocks away about 11.55 p. m. Alarm, Gamewell telegraph system. Duration, 1¼ hours. Stopped at second floor. Fire was favored by construction of building. Firemen handicapped by not having extension ladders long enough to reach top of building. Private fire apparatus, none. Persons in building, none. Means of escape, main entrance only. Value of building, $16,000; contents, $10,000. Property loss, $10,000.

December 27, 1919. Beeville, Tex. Grand Opera House Building, corner Washington and Bowie streets. Grocery store on first floor. Three 3-story buildings destroyed. Walls, brick. Floors, wood. Roofs, composition. Cause, unknown. Fire started on the stage of theater. Discovered by person ten blocks away about 12.30 a. m. Alarm, wildcat whistle at plant. Duration, about 12 hours. Stopped after opera house walls fell. Fire favored by poorly constructed walls. Firemen, handicapped by lack of water pressure and pumper, had to fight fire from ground. Private fire apparatus, none. Persons in building, none. Means of escape, fire escape. Value of buildings and contents,

$100,000. Property loss, $100,000. Papers were saved.

January 3, 1920. Danville, Va. Z. V. Johnson's Department Store, Broadway Theater, and many other buildings in business section, 407—429 Broadway. Five large buildings totally destroyed; 17 businesses included. Two other buildings damaged; 8 businesses included. Cause, unknown. Fire started in basement of Z. V. Johnson's Department Store. Discovered by citizen about 9.30 p. m. Alarm, fire box; later, telegraph to Greensboro department. Duration, about 6 hours. Stopped at Colquhoun street. Fire was favored by combustible material and construction of buildings. Firemen handicapped by shortage of men for such a large fire. Neighboring fire companies offered aid. Killed, none. Injured, 2 (firemen). Property loss, $415,772.

January 5, 1920. Van Buren, Me. Dreamland Theater, Main street. Moving pictures, grocery store, and bakery. One 2-story building damaged. Walls, wood. Floors, wood. Roof, tin. Cause, unknown; when discovered, whole building was aflame. Discovered by person passing on street about 3.45 p. m., who gave alarm. Duration, about 6 hours. Stopped at front part of building. Fire was favored, as building was just a big shell, finished with hard pine. Private fire apparatus, none. Persons in building, about 15. Killed, none. Injured, none. Means of escape, 5 exits at each side of building. Value of building and contents, $21,000. Property loss not reported.

January 9, 1920. Scranton, Pa. Household Outfitting Company and Manhattan Theater, 310-316 Lackawanna avenue. Furniture store and theater. One 4-story building destroyed, and one 8-story building damaged. Walls, brick. Floors, hardwood. Roofs, tin and slag. Cause, defective wire. Fire started in third floor section of elevator shaft. Discovered by employe of Lackawanna R. R. about 7.41 a. m. Alarm, bell. Duration, 4 hours, 21 minutes. Stopped at fourth floor. Fire was retarded by fire walls. Private fire apparatus, none. Persons in building, 20. Killed, none. Injured, none. Means of escape, fire escape. Value of buildings and contents, $270,000.

January 14, 1920. Salisbury, Mass. Ocean Echo, Salisbury Beach, ocean front at end of Broadway. Summer amusements, ice cream and confectionery stores, bowling alleys, and bath houses. One large 1-story building totally destroyed. Walls, wood. Floors, wood. Roofs, wood, covered with paper, tarred and graveled. Cause (supposed), set on fire by unknown person. Fire started in northwest end. Discovered by people in the town at about 8.15. Alarm, telephone. Duration, all night. Stopped after it had entirely consumed the building. Fire was favored by open wooden construction. Firemen handicapped by burst water main and cold weather. Private fire apparatus, none effective; as water main was out of order, sprinkling system could not work. Persons in building, none; building closed for the winter. Value of building and contents, $125,000. Property loss, $125,000.

From October to June this summer resort has a population of only a few families, besides U. S. Coast Guards and one policeman supplied by the town of Salisbury. Ocean Echo was built on piling driven beyond the high tide line.

January 26, 1920. Fayetteville, N. C. Hostess house at Camp Bragg, Block 9. One 1-story building damaged. Walls, pine wood with weatherboard. Floors, pine wood. Roof, pine wood, with roofing paper. Cause, overheated heater in basement. Fire started in kitchen or toilet, situated over heater. Discovered by smell of wood burning at about 8.30 a. m. Alarm, telephone. Duration, about 1 hour. Stopped at roof. Fire was favored by pine wood construction of building and also high wind. Private fire apparatus, fire extinguishers and pyrenes. Persons in building, 1. Killed, none. Injured, none. Means of escape, 5 double doors, swinging both ways. Value of building and contents and property loss undetermined.

April 9, 1920. Saint Catharine, Ont. La Crosse Park Grandstand, Catharine street. One 12-tier stand destroyed. Walls, open in front and ends. Floors, wood. Roof, plain board. Cause, unknown. Fire started in center. Discovered by passersby at about 4 a. m. Alarm, telephone. Duration, about 25 minutes. Stopped when stand burned down. Fire was favored by open wooden construction. Private fire apparatus, none.

April 12, 1920. Jamestown, N. Y. Auditorium at Celoron, Chautauqua Lake, in park. Dance hall and rink. Two 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, tar paper. Cause, unknown. Fire started at rear of building in bandstand. Discovered by passerby at about 7.30 p. m. Duration, about 16 hours. Stopped at front of building. Fire was favored by large dome construction, which acted like a furnace. Private fire apparatus, none. Persons in building, none. Means of escape, doors. Value of building and contents, about $50,000. Property loss, about $50,000.

September 23, 1920. St. Johns, Que. Thotoscope Theater, Main street. Moving picture house. One 1-story building damaged. Walls, brick. Floors, hardwood. Roof, felt. Cause, unknown. Fire started on stage. Discovered by police at about 12.30 a. m. Alarm, box. Duration, 15 minutes. Stopped at fire wall. Fire was retarded by building construction and extinguished by water and chemicals. Persons in building, none. Value of building and contents, $45,000. Property loss, $200.

Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

PYRENE EXPANDS

The Pyrene Manufacturing Company, manufacturers of Pyrene Fire Extinguisher, has made unusual strides during the past year toward broadening its line. Four new catalogs have been issued, covering the entire field of First Aid Fire Protection and Safety Devices, and a department has been organized to handle the new devices. This department, which will be known as the Safety & Fire Appliance Department, is under the management of Mr. E. E. Doane, formerly New England Manager for the American-LaFrance Fire Engine Company, and Sales & Advertising Manager for The O. J. Childs Company at Utica, N. Y. Mr. Doane has been actively connected with the sale of Fire Protection and Safety Devices during the past ten years, and has developed a department which will cooperate with industrial plants and assist in solving their fire protection and safety problems.

MR. E. E. DOANE

Mr. G. P. Rogers, General Sales and Advertising Manager of the Pyrene Company, announces that the company's safety engineering business is developing rapidly. It has been found advisable to extend the Safety and Fire Appliance Department so that a large part of the requests for information and service can be handled at the five branch offices located at: New York, 17 E. 49th St., Mr. F. W. Davis, Mgr.; Chicago, 17 So. Jefferson St., Mr. J. D. Cole, Mgr.; Atlanta, 24 Nassau St., Mr. C. A. Ragland, Mgr.; Kansas City, 1712 Grand Avenue, Mr. J. F. Renick, Mgr.; San Francisco, 527 Mission St., Mr. G. R. Harris, Mgr. Questions of major importance and policy only being referred to the General Sales Offices at 17 E 49th St., New York.

Already many new articles have been developed, notably the Fireklok, Accurate Five-Gallon Pump Tank, the Acid Syphon and Pyrene Safety Cleaner. In addition to these, there have been added such articles as the gas mask, safety and danger signs, aid kits, protective gloves and clothing, goggles, safety cans, and watchman's clock. Also, a complete line of two-wheel chemical fire engines besides fire hose, racks, valves, nozzles, axes, pails, and such articles of equipment for buildings.

Mr. Rogers aims to have all of the Pyrene Company's departments specialize in their particular line and function harmoniously with the work of recognized insurance, fire prevention and safety organizations.

C-H MAGNETIC CLUTCHES AS SAFETY DEVICES

The quick stopping of machinery in times of great emergency is an ever-present subject among safety engineers. The problems involved become increasingly difficult as the weight and speed of the machinery increases.

Many devices and methods have been tried out. Among the most successful of these is the magnetic clutch manufactured by the Cutler Hammer Manufacturing Company of Milwaukee. This clutch is placed between the

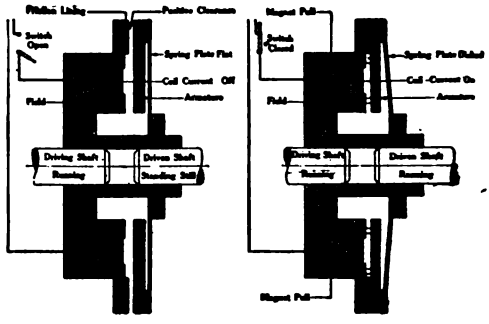
machine and the source of power. By pressing a button or opening a small switch located near the machine, the driving power can be disconnected immediately from the machine. Several such "stop" buttons or switches can be installed at different points on the machine or in different parts of the room so that the machine can be stopped from any one of these points when necessary.

One of the very best examples of the use of these clutches for safety stopping is to be found in connection with rubber mill machinery. The hazard assumed by workmen engaged about rubber mixing rollers, washers, crackers, and calenders has long been recognized. In the older mills much of this machinery was engine-driven from line shafts. In many such installations there was no means of shutting down individual machines or groups of machines in case of trouble. Modern mills are usually motor-driven and the power can be shut off the motor more quickly than in the case of the steam engine, but even so, the drift of the motor, line shaft and machinery is always considerable. Despite the lower weight of the rotating parts of an electric motor, the higher speed at which it revolves largely offsets its lesser weight so far as the effect of inertia is concerned. By installing a C-H magnetic clutch between the motor and the machinery, it is possible to disconnect the driving motor the instant a safety stop station is operated.

In the case of rubber mill machinery, it is usual to include a C-H magnetic brake in connection with the magnetic clutch. The connections of the brake and clutch windings are such that the setting of the brake and the releasing of the clutch are simultaneous in case of emergency stops. For service stops the clutch only is released and the machines are allowed to come to rest slowly.

Magnetic Clutch (54") and Magnetic Brake on a rubber mill drive

In practice, if a workman finds that one of his hands is about to be caught between the rolls, he can by a slight movement touch a so-called cradle switch just above his head. This disengages the magnetic clutch, sets the brake and stops the machine before his hand has been crushed between the rollers. Or if the workman who is about to meet with an accident, gives a cry of alarm, any other workman in the vicinity can immediately press one of the safety stop buttons scattered around the room. In any case, the machine can be stopped so quickly that it is very rare that a serious accident occurs in a plant equipped with these modern safety stops.



Current Off— Clutch disengaged **Current On Clutch engaged**

The operation of a C-H magnetic clutch is shown in the accompanying diagram. In order to engage or disengage the clutch, it is only necessary to turn the electric current on or off just like turning on or off an electric light. The control switch may be mounted at any point that is convenient, and as already stated, there may be several such control switches where this adds to the safety or convenience of the operator.

Exploded view of a C-H Magnetic Clutch showing armature member at right and field member at left.

There are other instances beside rubber mills where magnetic clutches are being used to add to the safety of the working conditions. However, these all depend primarily on the ability

to disconnect the driving power from the machine by means of remote control switches just as is done in the rubber mills. Nevertheless, the very compact structure of the clutch itself is also conducive to safety. Unlike many other types of clutches, there are no projecting parts to catch in clothing and no toggle joints, pivoted arms or sliding collars to cause trouble. One of the two members of the clutch is mounted on a spring plate or circular steel disc. When the electro magnet is energized and the two parts of the clutch are drawn together, this plate becomes slightly dished. When the clutch is de-energized, the plate springs back flat again and draws the two members apart. With this construction, there is no relative movement between any of the clutch parts—none of the objectionable wear or necessity for lubrication which would exist if a sliding key was used. The clutch can never lock or stick and prevent disengagement, which adds greatly to its safety.

AN IMPROVED "PRACTICOOL" DRINKING FOUNTAIN

The illustration herewith shows the Glauber Protected Automatic Gravity Angle Jet Bubbler assembled for installation on the well known "Practicool" Drinking Fountain.

With this bubbler the outlet is thoroughly protected by a cover located within the hood which operates automatically with the water pressure and instantaneously drops over the outlet when the water pressure is shut off. This construction eliminates all complicated parts and mechanism which might get out of order.

The bubbler can be furnished with bowl made of a beautiful and durable vitreous china or in enamelled iron if so preferred.

The "Practicool" is a refrigerating fountain, chilling the water to about 50° when it is kept supplied with ice. It holds a 75-lb. cake of ice, which is always a day's supply, and which will usually last two or three days. One fountain should be installed for each 20 to 25 men, to minimize loss of time.

This is manufactured by the Glauber Brass Manufacturing Company of Cleveland and their new catalog of factory sanitary plumbing fixtures describes not only their drinking fountains but fixtures for washing troughs, and showers; including their mixing valve for regulating the temperature of the water.

Each of these specialties carries out the "washing-in-running-water" idea, which was first advocated they believe, by the Sanitary Board of the American Steel & Wire Company, and which is now insisted upon by all leading Sanitary and Safety Engineers.

The superiority of this construction lies in the fact that the men wash in clean, running water, instead of in water which they themselves have made dirty, and in the elimination of the danger of contagion as a result of germs being left in the bowl by previous users.

GAS MASK FOR CARBON MONOXIDE PERFECTED

The first public demonstration of the gas mask for protection against carbon monoxide, manufactured by the Mine Safety Appliances Company, Pittsburgh, Pa., and in which is utilized the special chemical mixture called Hopcalite, developed by the U. S. Bureau of Mines and Chemical Warfare Service, U. S. Army, was given the afternoon of May 26 in the special smoke room of the U. S. Bureau of Mines, Pittsburgh, Pa. The U. S. Bureau of Mines in its research of various types of gas masks, including the carbon monoxide mask, has a large smoke room especially adapted for testing purposes and the courtesy of the use of this smoke room was extended for this demonstration. In addition the first public demonstration was also given of the U. S. Bureau of Mines Gas Mask for city firemen, also containing Hopcalite, for carbon monoxide protection.

In this test two men entered the smoke room, which contained 1% of carbon monoxide gas in the air. One of the men carried a canary bird into the room to indicate to the observers the poisonous nature of the atmosphere. The canary bird collapsed in 45 seconds, and was immediately removed to fresh air, where it was revived with oxygen.

Tests were also frequently made with the M-S-A Carbon Monoxide Detector to show the observers the strength of the gas. The wearers of the mask remained in the atmosphere for 30 minutes doing vigorous work part of the time, and experienced no ill effects whatever from the poisonous carbon monoxide gas. The gas masks gave perfect protection throughout the entire period of the test.

The carbon monoxide gas mask is of special interest to iron and steel industries, fire departments, industries using gas producers, illuminating gas plants, coal and metal mines and to all other persons who are apt to encounter carbon monoxide gas in their work.

Carbon monoxide occurs frequently in dangerous quantities around blast furnaces, gas producers, etc., and is a constant hazard because of its poisonous nature. A simple protective device, light in weight, devoid of all complicated

mechanisms has long been needed for the protection of men engaged in such work.

While the gas mask used will give protection in higher percentages of carbon monoxide, 1% of carbon monoxide in the air will kill a man in a few minutes time. The percentage found in working places where there is ventilation usually amounts to considerably less than 1%.

One-tenth of 1% of carbon monoxide, however, will seriously affect a man who is working and therefore breathing hard in about one-half hour's time, while .2 of 1% will affect him seriously in about 10 minutes' time.

The carbon monoxide gas mask is therefore of great importance to the country's industries and it is important to note that a splendid accomplishment of the U. S. Bureau of Mines and Chemical Warfare Service in their work on poisonous gases during the war has been adapted to a most important industrial use.

UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

AUTOMATIC SPRINKLER—Viking Corporation, The, Mfr., Hastings, Mich.

BRONZE GATE VALVES—FOR FIRE SERVICE—Rensselaer Valve Co., The., Mfr., Troy, N. Y.

CABINETS AND CUTOUT BOXES—SHEET METAL—Schmukler & Son, S., Mfr., 706 S. Second St., Philadelphia, Pa.

CABINETS AND CUTOUT BOXES—SHEET METAL—United Sheet Metal Works, Mfr., 960 Howard St., San Francisco, Cal.

CLASS C PREPARED ROOF COVERINGS—Heepes Roofing Division of The Richardson Co., The, Mfr., Melrose Park, Ill.

CLASS C PREFARED ROOF COVERINGS—Sidney Roofing & Paper Co., The, Ltd., Mfr., Victoria, B. C.

ENCLOSED SWITCH—Brown & Pengilly, Mfr., 607 E. Fourth St., Los Angeles, Cal.

ENCLOSED SWITCH—Globe Electric Works, Mfr., 1959 Mission St., San Francisco, Cal.

ENCLOSED SWITCHES—Square D Co., Mfr., Detroit, Mich.

ENCLOSED SWITCHES—Stewart Electrical Mfg. Co., Mfr., 60 Natoma St., San Francisco, Cal.

FIXTURE FITTINGS—National X-Ray Reflector Co., Mfr., 235 W. Jackson Blvd., Chicago, Ill.

FIXTURE SWITCHES—Weber Electric Co., Mfr., Schenectady, N. Y.

FUSELESS ATTACHMENT PLUG—Connecticut Electric Mfg. Co., The., Mfr., Bridgeport, Conn.

FUSELESS ROSETTES—Weber Electric Co., Mfr., Schenectady, N. Y.

HEATER CORD—Marion Insulated Wire & Rubber Co., Mfr., Marion, Ind.

IRON BODY GATE VALVES FOR FIRE SERVICE—Rensselaer Valve Co., The, Mfr., Troy, N. Y.

KNIFE SWITCHES—Laganke Electrical Co., Mfr., 6969 Aetna Rd., Cleveland, Ohio.

KNIFE SWITCHES—Walker Electric Co., Mfr., 1020 Susquehanna Ave., Philadelphia, Pa.

MEDIUM BASE SOCKETS—Weber Electric Co., Mfr., Schenectady, N. Y.

MOGUL BASE SOCKETS—Weber Electric Co., Mfr., Schenectady, N. Y.

MOTION PICTURE MACHINE—Fitzpatrick & McElroy, Submittor, 202 S. State St., Chicago, Ill.

SLIDING OR SWINGING, SHEET METAL, FIRE WALL DOOR—Stremel Bros. Roofing & Cornice Co., Mfr., 1316 N. Third St., Minneapolis, Minn.

SLIDING OR SWITCHING, TIN-CLAD, FIRE WALL DOOR—Western Steel Products Co., Mfr., St. Croix Ave. and Sutphin St., Duluth, Minn.

SWINGING, HOLLOW-METAL, VERTICAL COMMUNICATION DOOR—Central Metal Products Corp., Mfr., College Point, N. Y.

SWINGING, METAL-CLAD, VERTICAL COMMUNICATION DOOR—Howie Co., Inc., The., Mfr., 5241 Wesson Ave., Detroit, Mich.

SWINGING, METAL-CLAD, VERTICAL COMMUNICATION DOOR—Lee & Son Co., Thomas, Mfr., 128-32 W. Second St., Cincinnati, O.

SWINGING, SHEET-METAL SHUTTER—Reed & Co., Geo. W., Ltd., Mfr., 37 St. Antoine St., Montreal, Can.

SWITCH BOXES—All-Steel-Equip. Co., Mfr., Aurora, Ill.

SWITCH BOXES—Austin Co., The, M. B., Submittor, 108 S. Desplaines St., Chicago, Ill.

SWITCH BOXES—Michigan Stamping Co., Mfr., Detroit, Mich.

THERMOSTAT—Westinghouse Elec. & Mfg. Co., Mfr., East Pittsburgh, Pa.

TIME RECORDING APPLIANCES—Gisholt Machine Co., Mfr., Madison, Wis.

TIME RECORDING APPLIANCES—Stromberg Electric Co., Mfr., 606 So. Michigan Ave., Chicago, Ill.

UNDERGROUND STORAGE TANKS—Adamson Mfg. Co., Mfr., East Palestine, O.

UNDERGROUND STORAGE TANKS—American Oil Pump & Tank Co., Mfr., Findlay & Dalton Sts., Cincinnati, O.

UNDERGROUND STORAGE TANKS—Canton Tank & Mfg. Co., The, Mfr., 9th & Robin Sts., S. E., Canton, Ohio.

UNDERGROUND STORAGE TANKS—Engineering Co., The, Mfr., 1600 Winter St., Fort Wayne, Ind.

UNDERGROUND STORAGE TANKS—Hamler Boiler & Tank Co., Mfr., 66th St. & 60th Ave., Chicago, Ill.

UNDERGROUND STORAGE TANKS—Southern Metal Co., Inc., Mfr., P. O. Box 834, Lake Charles, La.

UNDERGROUND STORAGE TANKS—Steel Trough & Machine Co., The, Mfr., 1 James St., Tweed, Ontario, Can.

VAPOR-PROOF FIXTURES—Benjamin Electric Mfg. Co., Mfr., 120-128 Sangamon St., Chicago, Ill.

WIRE CONNECTORS—Frankel Connector Co., Inc., Mfr., 177-179 Hudson St., New York, N. Y.

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Caught at Moment the Tank Boiled Over

Photograph by George Oliver Smith of the American Atmos Corporation.

This remarkable photograph was taken just at the moment when the tank started to boil over. It shows the great danger of an oil fire, having several tanks grouped closely together and so heavily exposed to the first burst of flame. The men about the tanks show their eagerness to leave the vicinity, and even the one who plies the hose is keeping as far away as he can. The scene of conflagration was the Jersey meadow along the Rahway river and Staten Island sound, where the huge tanks and stills of the Warner-Quinlan Asphalt Company at Linden, N. J., spread asphalt, gasoline and light oils over five acres. Fire started on July 18 and continued until next day. See "Fires in Oil Works and Tanks," on pages 91, 92 and 93.

A Year's Developments in the Science of Industrial Lighting

Report of the Lighting Sales Bureau, National Electric Light Association

Condensed by J. Daniels

Of the Edison Electric Illuminating Company of Boston

THE Lighting Sales Bureau, Commercial Section of the National Electric Light Association, presented to the Forty-Fourth Annual Convention at Chicago, May 31-June 3, 1921, a report covering in a complete manner the year's industrial lighting developments, and showing their importance to lighting development interests. During the past year the bureau attempted:

1. To promote appreciation of the present and potential value of lighting to the electrical industry.

2. To collect, analyze and disseminate information concerning lighting practice.

3. To promote lighting sales.

The special aim of the bureau's report this year was to present information on the industrial lighting field.

REPORT OF THE EDUCATIONAL EXHIBIT COMMITTEE, LIGHTING DEPARTMENT

This department is a new one created for the express purpose of promoting the installation of industrial lighting demonstrations throughout the country.

An Installation of Local Lighting

The work of organizing bodies, supervising and erecting exhibits, and promoting their use was delegated to a field director and three field representatives.

There were in all 32 cities visited by the field representatives. As a result, there were on May 1, 8 industrial lighting exhibits in full operation, opened in the following order:—Baltimore, New York, San Francisco, Louisville, Cincinnati, Cleveland, Buffalo and Pittsburgh. Besides these completed exhibits, Boston, Los Angeles and Portland had demonstrations under construction, and Seattle, Rochester, Indianapolis, Minneapolis, Omaha and St. Paul had decided to put on an exhibition. The 17 remaining cities visited had not as yet reached a decision.

In addition to his report of activities in the establishment of permanent lighting demonstration rooms, Ward Harrison, field director, presented "A Standard Outline" for a lecture to be used by speakers at typical N. E. L. A. demonstrations of industrial lighting. It also includes text for a lecture, probably one of the finest summaries now available of the benefits to be derived from good industrial lighting.

As a result of these exhibits, the subject of industrial lighting has received nation-wide attention. In those localities where the demonstrations are being made the installations are being used to their fullest extent under the auspices of the organization that put on the demonstration, or by it in co-operation with other organized bodies or individuals who have made requests for a talk on the subject of industrial lighting.

In addition to serving the purpose of promoting education in industrial lighting, the demonstrations are also being

The Same Room with General Illumination

used by organizations whose meetings pertain to various subjects to which lighting is incidental, but who use it as part of their programs.

INDUSTRIAL LIGHTING DIVISION

The report of this division was presented in three sections, viz.:

Section 1.—*Advantage of Good Lighting to the Customer.* This section pointed out the advantage of good lighting both to employer and to employe. Curves were included, showing increased cost of living contrasted with the decreased cost of electricity for lighting, "before" and "after" pictures of lighting installations that have proven successful, accident curves and production curves.

Section 2.—*The Advantage of Industrial Lighting Load to the Central Station.* The size of the field was emphasized, and also how better lighting will automatically increase power consumption.

Section 3.—*Industrial Lighting Practice.* This section has been issued in its completed form in "The Electrical Salesman's Handbook," which consists of data sheets showing typical floor plans, machine layouts and representative lighting layouts.

The summary of this report states: "The pendulum of industrial production, as was expected, has swung back from war conditions to the negative side. It must, however, soon reach its normal balance, and efficient and sane management must study conditions necessary to the somewhat new order of things.

"Just as efficient lighting with the resultant increased production reduced spoilage; less accidents and improved physical and psychological effect on employes aided the manufacturer in the past rush of business, so it will aid them in the reconstruction period."

THE ADVANTAGES OF GOOD LIGHTING TO EMPLOYERS AND EMPLOYES

Perhaps this feature of better lighting received more study during the past year than any other. The economics of production demanded the utilization of every reasonable means to produce more and better goods at less output cost. Nowhere are the good features of lighting more patent than in the last year's attention to higher standards of lighting intensities and to the improved safety and hygienic conditions following better factory illumination.

It has been proved beyond a doubt that good lighting in industrial operations—

Increases output of manufactured materials,

Decreases percentage of defects and spoilage,

Lowers accident rate and reduces injuries,

Lessens eye-fatigue and improves health,

Improves morale through improved environment,

Lessens supervision and labor turnover,

Reduces unit costs of production,

Possesses advertising value, and bespeaks prosperity and good management.

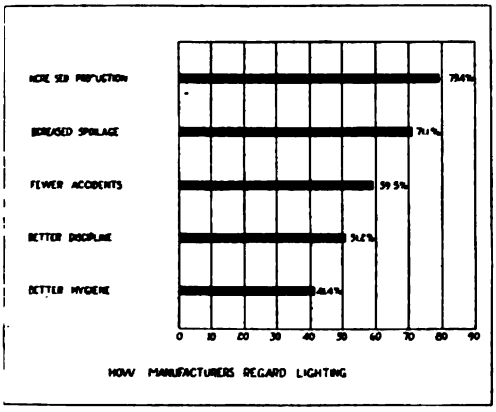
One of the most gratifying results of the educational work done to explain these facts to the consumer is the increased study upon the part of the manufacturers of the possible benefits which they may derive. Manufacturers regard lighting less and less as a necessary evil and more and more as an agent of thrift. Four-fifths of the executives of the average plants look to better illumination to increase production, and they frequently experience the increases. Their faith in the ability of the illuminating engineer to help solve their pocket-book problems is not misplaced, as the following quotation shows:

"The production test on the spinning machines has shown an increase of approximately 17 per cent in material turned out. The material coming from the machines was weighed under normal conditions for two successive days averaging 59.4 pounds per hour. Without changing any other factor except that of the light, which was raised from 1.5 to 9.0 foot-candles, the material coming from the machines was again weighed for two successive days, the amount turned out averaging 70.1 pounds per hour.

"The increase is rather noteworthy, as it was impossible to advance the speed on the machines, the only chance for a

gain in production being in the stimulation the operator experienced under the increased lighting, resulting in more rapid movements during the periods when hand operations were required on the machines."

From the standpoint of the employe, good lighting *per se* is seldom given a



Advantages of scientific lighting are increased production, decreased spoilage, fewer accidents, better discipline and better hygiene.

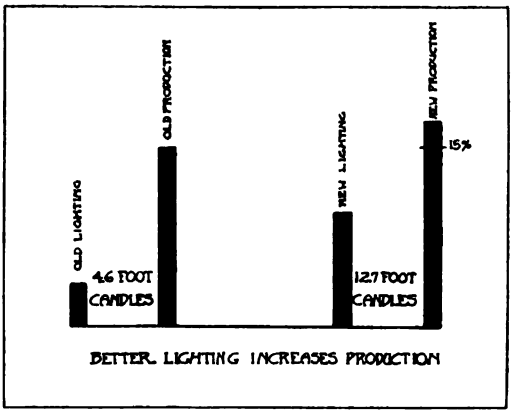
concerted thought or an expressed opinion, yet discontent that breeds in unpleasant surroundings, and restlessness which originates in strained nerves and imperfect health often has no outlet except through a strike. Sanitation, better hygiene, and improved morale are emphasized by or follow directly as a part of the light, cheerful, wide-awake and glarelessly-lighted factory.

TIME-ELEMENT OF VISION

A notable development of a study of bodily movement as influenced by higher intensities of illumination appeared during the year, known usually as the time-element of vision. It was learned that the mere seeing of an object is not the end or ultimate goal of the human eye's function. There are different degrees of seeing; hence comes the question of how to see better and more quickly. The eye, like the camera, requires a time-exposure for the "taking of the picture" if the illumination be low. And in order to reduce this time to a minimum, i.e., to take an optical snapshot, we require relatively high values of illumination upon the subject. This ability to perceive details instantly speeds up the dependent muscular action, and partially explains increased industrial output.

NO MERCHANDISER CAN AFFORD TO NEGLECT PROPER INSTALLATION AND MAINTENANCE

Finally, it might be emphasized that most of the advantages of artificial lighting are the result of not merely "lighting," but of "good lighting." The duty devolves upon the producer of electrical power to make its consumption attractive and easy. Clouding illumination with super-technical terms, generating a spirit of vagueness and fear in the consumer's mind, is certainly responsible for much of the reluctance to purchase and use lighting devices. Moreover, no merchandiser can afford to sell inferior goods. Least of all can he afford to



New lighting methods have increased production 15 per cent.

neglect its proper installation and maintenance, lest the disgruntled customer express his dissatisfaction by not spending money for either good or bad lighting. Constantly acquainting the consumer with the best features of lighting, and explaining the many advantages of good, better and best illumination, will develop the industry, and will lead to such installations as leave in the mind of the consumer the conviction that he is securing advantages from good lighting far beyond his actual cash investment.

The Eye Is Mightier Than the Hand

By Archibald C. Reid

Assistant General Manager, Toch Brothers, New York

ABOUT a year ago I visited the office of a large packing house in Chicago, and the first thing my guide called attention to was the scientific lighting of the interior of the building, especially in regard to the color and character of the paint on the walls and ceilings.

A month later the efficient result of the painting of the interior of a flour mill came under my observation.

Practically every trade paper and technical magazine that one picks up today mentions some specific advantage gained from using the proper care in the selection of paint for covering the walls, ceilings and floors of all types of industrial plants.

The eye is mightier than the hand. This is true even in the office where the typist is working without looking at the keys, and of course, it is a thousand times more important where the machine operative is handling a press which has an element of danger when some disturbing factor makes the operative relax his vigilance.

LIGHT AN EMPLOYMENT SAFEGUARD

Consciously or unconsciously, a man, like every other product of nature, seeks light in his daily work, as it is one of the factors which contribute to his contentment and his peace of mind, and which safeguard him against the hazards of his employment.

You have rarely seen a dimly-lighted, dark-cornered manufacturing plant that was producing good materials, whether shoes or textiles, at a profit. On the other hand, a plant which is modern in its industry and organization, which is at the top or is rapidly climbing, points to its factory or workrooms with pride, and is particularly proud of the cleanliness, brightness and general atmosphere of contentment.

Owners of modern establishments are familiar with these facts, and experts on illumination and technical paint men are constantly being called upon to give advice and suggestions. They are presenting facts and figures as to the cost of painting walls, floors, ceilings and eqipment, not merely from the standpoint of what it will cost for so many barrels of paint, brushes, and the labor involved, but with the knowledge that failure to paint results in increased costs for electric lighting, lessened output, and spoilage.

Light colored enamel on machinery brings out in relief the finer pieces of mechanism, safeguards the equipment against damage, and most important of all, relieves the strain on the operators' eyes, reducing spoilage and accidents to the minimum.

Light is a natural enemy of dirt, a natural enemy of laziness, and a natural enemy of carelessness. The lathe, plane or drill press painted in a light color has been found by actual experience to receive better care and produce finer work than those painted black, because an operative hesitates to allow dirt, oil and grease to accumulate on a finely finished, bright colored machine.

In hospitals, practically everything is painted white. This, of course, is primarily for sanitation. It has the effect of bringing cheerfulness into the institution. In the operating rooms the brightness of the walls establishes an element of confidence, because where there is real light there is elimination of guesswork.

This identical principle is daily being applied with profit to industrial plants, by brightening up the dark spots, prolonging and multiplying the amount of daylight, thereby increasing the productiveness of employes and lessening their liability to mistakes and accidents.

EYE-STRAIN AND MORALE

In many plants operatives are obliged to work at places some distance from the windows; consequently at certain periods of the day they are in semi-darkness. In

such circumstances eye-strain develops, things cannot be seen clearly, a very noticeable decrease in production and efficiency results, and the morale of the workers is impaired.

Brighter surroundings mean greater satisfaction among employes, and give rise to a certain pride of accomplishment. Light has a vast influence on a man's entire outlook. Kept in a cheerful frame of mind by his surroundings, the natural result is that the work is turned out to the best of the operator's ability.

Considerable discussion is current as to the relative merits of flat and glossy paints. Experience seems to point to the conclusion that flat paints possess higher light-reflecting values, due to the higher percentage of pigment which they contain. The fact remains, however, that glossy paint is preferable in a majority of instances because dust does not stick so well to its hard, smooth finish, and it stands washing better than flat paint.

While a glaring whiteness should be avoided in the plant because of its harmful effects, no difficulty should be experienced in the selection of suitable coatings for floors, walls, ceilings and equipment, or the decoration of offices, with the type of paints and enamels that will relieve eye strain, and increase the efficiency and morale of the workers, if advantage is taken of the knowledge of men, both in and out of the paint business, who have given the question of proper lighting a very careful study. Plant managers and owners should seek out these men and get their advice, because the money spent in this way is not an expense, but an investment which will pay good dividends.

Paint as an Accident Reducer

By Gardner Tillinghast

Of the U. S. Gutta Percha Paint Company

STATISTICS and our own experience in mill white manufacture enable us to state positively that in December, when daylight is poorest, over twice as many industrial accidents occur as in June when the days are longest. In December lighting facilities are poorest because of the short days and need for artificial light. The fact that more accidents occur in this month than in any other month leads us to believe that poor light is the reason for the high mortality in that month.

IMPERFECT LIGHT A CAUSE OF FATIGUE

Dr. Harrington of the National Industrial Board claims that factory fatigue is brought on more quickly by imperfect light than any other cause. When a workman is fatigued because of poor light he is most careless, and then, statistics show, the most accidents occur.

From insurance figures we find that over 500,000 avoidable industrial accidents occur every year, and that of these 125,000 or 415 a day, are due to poor light.

Any one can readily see that good lighting is not obtained unless the ceilings and walls are painted a pure white, and a white that will stay white and not lose its color.

CENTER LIGHTING HALF REFLECTED

Over one-half of the lighting from the center of the room is diffused by reflection from ceilings and walls. If there is not white paint on the ceilings and walls fifty per cent of the light entering the windows will be absorbed and never reach the center of the room or farthest side. In other words, the workmen farthest from the windows receive only about 50 per cent of the light provided by windows, when the ceilings and walls are not painted white.

DECREASES DAYLIGHT 36 PER CENT

A gloss-white paint has the reflecting and diffusing power of white tile. Its pure white, glossy, tile-like surface reflects *all* the light that enters the factory windows, by actual test increasing daylight 19 to 36 per cent during factory working hours.

Flat-finish paints have none of the advantages of gloss. They absorb part of the light instead of reflecting and diffusing all of it. They collect dirt instead of repelling it.

We have arrived at the point of believing, from numerous investigations, that every mill man is sold on the idea of white paint as a light reflector. Practically every worth-while concern uses white paint on its ceilings and walls, except in cases where it is impossible to secure a white coating that will stand up at all. In mentioning this last branch of industry we might add that even foundries are being painted white now because the owners and managers realize the advantages of white paint in reducing accidents, creating contentment and doing away with the greatest enemy of the inside workman, FACTORY FATIGUE, the indirect cause of many otherwise-classified accidents.

Serious Accidents at Anaconda Fewer Than Average of Metal Mines

IF the metal mines of the United States had all had the same serious-accident rate as the Anaconda Copper Mining Company for the years 1916-19, the 39,705 such accidents reported would have been reduced to 21,000, or the country's metal-mine serious accidents would have been nearly one-half less, and there would have been 18,705 fewer serious accidents than actually occurred.

During the 6-year period 1915-20, the Anaconda statistics show only 2,005 serious and fatal accidents, and of these, 200 were fatalities, leaving 1,805 serious accidents (a serious accident being one in which 14 or more days' time are lost). This is at a rate of 9,120 shifts per serious accident and at a rate of 82,304 shifts per fatality. Hence, if 300 days be adopted as a year's work, there would be one fatality per 274.3 years of work in these mines and one serious accident for every 30.4 years' work.

Almost exactly one-tenth of the total serious and fatal accidents in the 32 mines were fatalities. The fatal-accident rate of 0.121 per 10,000 shifts is very similar to the country's metal-mine record, this being 0.121, 0.148, 0.119 and 0.114 fatalities per 10,000 shifts worked for all the metal mines of the United States for the years 1916, 1917, 1918 and 1919, respectively.

The accident rate for all the metal mines of the United States during the six-year period averages about 2.000 fatal plus serious accidents per 10,000 shifts, against the 1.218 rate at Anaconda.

The best record of the 32 mines is held by the Reins mine, which is occupied wholly with fire-fighting and slime filling of fire regions of the West Colusa, Leonard and Tramway mines, so that its work is almost constantly in high temperatures, dangerous gases, broken ground and other dangerous conditions. Much of the work has been done by men wearing oxygen breathing apparatus.

The very good record of mines with large number of shifts worked, such as the High Ore, Leonard, Poulin, Mountain View, Never Sweat, Bell, Anaconda, Badger and others, is deserving of the strongest commendation, as most of these mines are deep, have hot workings and have been heavy producers, yet have taken time to devote much attention to the forwarding of safety. The record for these mines was 1.218 serious and fatal accidents per 10,000 shifts.

The record for 1916 and 1917 is better than for the more recent years, when the company relaxed the comparatively rigid discipline in regard to safety matters which had been in effect during 1916-17.

The relaxation shown in these figures would indicate a coming increase in accident rates for 1921, as work at the Anaconda smelter has decreased so that the Anaconda Technical Society has lost many of its members, although it still holds meetings at which safety and engineering technical topics are discussed by members still employed.

Safety-Trip for Punch Presses

By C. E. Wildoner

Safety Engineer, Huntington, W. Va.

Fig. 1

Fig. 2

THE Standard Stamping Company of Huntington, W. Va., manufacturers of hardware and electrical specialties, has devised a simple safety-trip arrangement for punch presses as shown in the accompanying illustrations.

A steel band ⅛ in. x 1 in. (heavier material on larger presses) is bent in U-form and attached at the two ends to the frame of the press by shoulder screws (Fig. 1). In front at the center of this band is attached firmly a piece of the same material which extends downward vertically. An auger handle is slotted and mounted loosely at the lower end of the vertical piece and is supported in a horizontal position by a light coil spring as shown. The trip chain is fastened to the U-shaped piece on the side under the clutch in such manner that it may be removed and attached to the foot-trip when the press is used on long strip material requiring both hands for feeding. On the side opposite the clutch, a light

Fig. 3

coil spring compensates for the weight of the device.

It is very difficult to operate the device except by pressing down both ends of the handle at the same time, as shown in Fig. 2. Should the operator attempt to trip the press with one hand, as shown in Fig. 3, the opposite end of the handle merely flies up without moving the trip-chain.

The Standard Stamping Company has been operating 36 presses with this safety device for more than a year, during which time not a single accident has occurred on the presses.

It does not in any way interfere with the operator's view of the work. Many safety devices seem deficient in this respect, particularly those designed to push the operator's hands out of dangerous positions.

The device also has the advantage of low cost and easy installation. It is not patented and the Standard Stamping Company invites its use freely by any interested employer.

Water Supply Protected by Signal System

SALT LAKE CITY has extended the use of the police signal system to the canyons from which its water-supply is drawn. Tank men guard the intakes and reservoirs, and there is police patrol to guard against any pollution of the water-supply. The system is described by Superintendent Charles J. Reading in a recent issue of the *American City*.

To make quick communicaion with the head office of the water-works department possible to the tank men and the patrol, police boxes have been placed at all reservoirs and intakes. These are connected with the main fire and police alarm office, then through a relay to a recording set in the office of the superintendent of waterworks. This set registers the box number and stamps the time of registration. The boxes have a complete telephone set. All tank men and patrolmen are required to report in each hour and they may be called by a bell rung from the central office.

The entire system comprises: the Gamewell central desk; the recording set in the superintendent's office; 20 miles of line constructed of No. 12 galvanized iron wire; 4 miles of underground cable; and 11 police boxes. The recording set in the superintendent's office consists of one Ideal punch register, one Gamewell time stamp, and one take-up reel.

Besides enabling the superintendent of the water-works department to keep track of the activities of the men in his employ, the signal system makes it possible for the caretaker of each branch to regulate the volume of water supplied to the city water system from his branch.

Since most of the reservoirs and conduits are located in the heart of the rugged mountains, several miles from the city, the system has proved invaluable also in guarding against grass and forest fires in the summer time. Whether Salt Lake City's water-supply is high or low in the summer depends to a great extent on the amount of snow stored in the hills in the winter. A heavy growth of grass and underbrush tends to hold the snow and prevent it from blowing off the hills or melting so rapidly that it simply runs off in a torrent and fails to soak into the ground. These growths of grass and brush cover the watersheds, and great care is taken in the dry months of summer to prevent their firing. In a few minutes after an alarm a large number of men from other points of the system are on the way to fight the fire. In this way the signal system has been instrumental in avoiding much harm to the watersheds.

A Model Protective Street Shed

RECENTLY, there has been considerable discussion, at meetings of the American Society of Safety Engineers and elsewhere, of protective street sheds and other methods and precautions in the construction or demolition of buildings. The accompanying picture shows a protected shed that may be regarded as a model, designed by engineers of the Travelers Insurance Company whose inspectors have watched the construction, day by day, to see that safety rules were observed. The structure is the 16-story building of the Hartford-Connecticut Trust Company in Hartford.

It has been a wonderful sight to see this building going up at top speed, everything done well and all matters of safety taken care of thoroughly. The trust company co-operated whole-heartedly in the plans for the safeguarding of workmen and public. This particular building operation affords a fine example of up-to-date accident prevention work in building construction.

Courtesy of the Travelers Insurance Company

This illustration of the Hartford-Connecticut Trust Company in Hartford shows the protection over the sidewalk. The building is equipped with hanging safety scaffolds which are screened in, roofed over, toe-boarded, and have backrails. The surrounding alleys and yards are also all covered over. Since the picture was taken the building has been topped-off. It has been an interesting spectacle to note the extent to which the builders have gone in safety lines. All the elevator openings have been railed in and those just above the floor where the masons are working have been planked to catch falling objects. All of the well holes in the building are also railed in. It is a 16-story structure and the second largest of Hartford's skyscrapers.

Building Bridges To Burn

Photograph by Fred S. Rankins, Lynn, Mass.

Saugus River Bridge between Revere and Lynn, Mass., on the State Road along the shore north of Boston. The bridge burned June 17, 1921, and has not yet been rebuilt.

THE wooden bridge spanning the Saugus River between Revere (Point of Pines) and Lynn, Mass., was completely destroyed on June 17, 1921, by fire of undetermined origin.

The structure is to be at once rebuilt of wood, practically a reproduction of that burned, at an approximate cost of $30,000.

Within the past two years there has been something approaching a new epidemic of fires in combustible or semi-combustible bridges, some, like the fire in the Victoria bridge at Montreal, seriously obstructing vital traffic for a considerable period, and the fire in the Dover Street bridge in Boston, which threatened paralysis of a considerable part of water and electric light and power service, all of which have been freely commented on and the fallacy of combustible construction pointed out.

The Saugus bridge fire and the determination to rebuild of wood, like the burned structure, does not appear to afford an excuse for a homily. Its economic value was practically nothing, serving as it did almost entirely as a convenience to pleasure automobiles which have been forced to detour since its destruction at the estimated rate of over 12,000 per week. It endangered nothing but itself and it is fully conceivable and excusable that time required for replacement, particularly in Summer, should be the chief element in determining material, a determination hardly to be criticised under the circumstances, but rather to be looked upon as an exception to the rule favoring non-combustible construction.

Structures like the Victoria bridge, city and railroad bridges, and bridges on highways serving important traffic, should be always as nearly indestructible as is possible, a proposition that can hardly be supported too strongly, but which somehow fails when the element of utility is lacking, meaning vital utility to the entire community. Therefore, while it would have been a pleasing concession to principle to have reconstructed

the Saugus bridge fire-resisting, the decision otherwise can hardly be severely criticized.

ASPHALT ON WOOD HAZARDOUS

An editorial of the *Boston Herald* on the proposal to "improve" the fire hazard of the Harvard Bridge, one of the most important bridges spanning the Charles River and connecting Boston and Cambridge, by overlaying the planking of the roadway (not including footways) with an asphalt concrete composition is worth reproducing.

Plainly the essential fire risk remains unchanged. The sides of the wide cracks in the wooden sidewalks will continue to flutter with red whenever a smouldering cigarette rolls in. The heavy timbering beneath the present plank pavement would remain a menace, dryer if anything than at present. The dangers from short-circuiting of feed wires would not be lessened. The only reduction of fire hazard would result from the lessening of wooden litter on the surface of the roadways and the filling of some wooden crevices in which the unintended slow matches now find lodgment. The deck of the Harvard bridge was unfortunately "built to burn," and no overlay of tarry mastic, crushed stone and asphalt would seriously alter the hazards inherent in its construction.

Boston has had several serious fires in bridges of similar type, being practically wooden structures on steel framework, the interlacing timbers offering excellent places of lodgment for sparks, exposed by passing tugs or locomotives and also sifting of cigarette butts and the like through crevices in the roadway. One fire in particular threatened the lighting system of the entire city, and the several fires involved heavy money loss in the aggregate. Nor, unfortunately, does Boston enjoy a monopoly in this respect.

The unpleasant fact is that a very considerable portion of the important bridges everywhere are built to burn, and the burning involves much needless property loss and in many cases a consequential loss far in excess of that.

Is it not nearly time for taxpayers and business men who depend largely upon the use of bridges to say to their local authorities, "Here is a condition brought about mainly by your lack of foresight. What are you going to do about it?" Such conditions, if accepted as a matter of course, remain perpetually a menace.

Public Health and the Foreign-Born

RECENT investigations have disclosed a consistent variation in the liability to accidents and the prevalence of certain diseases between the native and foreign-born white populations that means a need for particular care on the part of public health authorities. Dr. Michael M. Davis, Jr., has completed his book, "Immigrant Health and the Community"; this is one of a series resulting from the Carnegie Corporation's Study of the Methods of Americanization, and is published by Harper's. It shows that industrial health work is an urgent need, while admitting the inadequacy of racial mortality and morbidity statistics.

The Metropolitan Life Insurance Company in its *Statistical Bulletin* has summarized this question as follows:

In addition to disease the foreign-born in our midst suffer particularly from high accident rates. This applies especially to the non-English-speaking workers who, more than others, suffer from industrial accidents. Wherever data are carefully kept the foreign-born show accident rates approximately double that of the native born. The Commonwealth Steel Company of St. Louis states that 80 per cent of the injuries occurring among their workers were among the non-English-speaking employes who constituted only 34 per cent of the force; and the Bethlehem Steel Company in like manner records that two-thirds of the more serious accidents and nearly one-half of the fatal accidents occurred among the foreign-born who constituted only 30 per cent of the employes. According to the Report of the New York State Industrial Commission 70 per cent of the applicants who applied for compensation required the services of an interpreter. If a man cannot present his claim in English he is obviously unable to understand work directions and safety regulations and thus is exposed to

needless injury. *Inability to read English makes placards of warning futile and safety precautions lose their force* because the worker is ignorant of their use. *Safety committees have been the first to recognise the importance of these facts* and have attempted to meet the situation by conducting English classes for the benefit of the workers. The Ford Motor Company officials state that accidents have fallen off 54 per cent since their school was started in May, 1914.

Besides their susceptibility to accident, the 14,000,000 foreign-born in the United States have demonstrated peculiarities in the prevalence of disease.

The studies of the Children's Bureau have shown very conclusively that among certain nationalities, especially the Slavic races, the infant mortality rate is very high—many deaths occurring from causes which are easily preventable through the application of ordinary sanitary precautions. The communicable diseases of childhood are particularly dangerous among some of the foreign stocks, especially the Italians, among whom in many instances measles and scarlet fever develop into fatal pneumonias. In the ages of adult life, tuberculosis is a more serious problem among the foreign-born than among the native stock, being especially dangerous among the Irish of our cities. The degenerative diseases, including organic heart disease and Bright's disease, have been shown to be much more prevalent among the foreign-born stocks, more especially among the Irish and German races. Practically every foreign race shows higher cancer rates than do the native born—Italians being the only nationality excepted. Each of these conditions points definitely to the need of concentrating health work upon the foreign populations in order to reduce the death rate.

From whatever angle we view the health problem of the immigrant we are impressed with the necessity for specialized effort to conserve his health. Physicians, industrial and visiting nurses, social workers, workers in health departments and schools, should seek to understand the social habits, native characteristics, and cultural background of the foreign population and deal sympathetically with them.

An increased knowledge of our institutions, educational work in the factory, the development of public health lectures and the wider distribution of health and safety literature will, in a short time, help in the readjustment of the foreigner to his new environment, providing the right attitude is kept.

Accidents Due to Fireworks

THERE have been 1,239 fatalities in the United States from fireworks in the last 14 years, 500 of them tetanus, and 227 by burning to death. The "harmless sparkler" is said to have caused more than half.

Despite the ban on fireworks, 20 persons were injured by explosives in Fourth of July celebrations in and near New York City this year, and 9 persons received tetanus antitoxin treatment at City Hospital, Jersey City.

"The Chinaman on New Year's day, the Southerner at Christmas time, and the American boy on July 4, discharge fireworks purely for excitement, not because of Confucianism, Christianity or patriotism," says a report of the Wisconsin State Industrial Commission. "In years past this practice has caused many injuries, deaths, and much property loss. Sane celebrations of later years have saved these sacrifices of life, limb and property, and amusements and patriotic exercises have taken the place of noise and carnage."

But later years have still a horrifying total of "amusement"-caused injuries and deaths. A bad explosion of unlawfully stored fireworks occurred at Racine, Wis., last year. A more serious one at Chicago, March 18, 1921, killed 8 people, injured many others, and rendered 100 homeless. A similar explosion this spring at Randolph, Mass., shows that the danger is still alive.

Municipal celebrations should be held in parks, on river banks and lake shores, away from buildings, and only fire department officials should be placed in charge.

"Let sanity and safety of life and property prevail over dangerous and meaningless noise," and not only in Wisconsin.

Value of Spark-Resistive Shingles

Photograph by Fred S. Rankins, Lynn, Mass.

Hampton Beach, N. H., fire-swept on June 26. The picture shows the ruins of the Janvrin Hotel. The rapid spread of the fire over a large area was directly traceable to wooden shingle roofs. Two cottages provided with spark resistive shingles provided a sufficient barrier to enable the conflagration to be arrested in one direction.

"HISTORY repeats itself," which, being interpreted, is to say that similar conditions may in time be expected to produce like results and, "though the mills of God grind slowly, yet they grind exceeding sure."

In September, 1916, practically the same territory was swept by a conflagration. It was then fairly well covered by wooden cottages, chiefly with wooden shingle roofs, somewhat congested in parts as regards spacing and with a sprinkling of larger wooden structures occupied for hotels, boarding houses and other non-residence purposes—simply a typical "beach resort."

Very little appears to have been done in rebuilding to materially improve conditions. Apparently no effective restrictions as to construction, spacing and the use of wooden shingles for roofs were adopted and enforced; no adequate water supply was provided and the fire protection was limited to one motorized chemical wagon. In short, nothing was actually done in the way of preventing recurrence of conditions similar to those which produced the disaster of 1916. Although many of the newer houses were more costly and of better construction than the old ones, the difference does not appear traceable to restrictions.

The theory that lightning does not strike twice in the same place does not

hold good unless the cause of the first stroke is removed, and Providence is not always kind to those who fail to profit by adversity.

Individually earnest sympathy is due to those, mainly blameless, who suffered loss. It is also a cause for rejoicing that so rapid a conflagration at such an hour (2.45 a. m.) did not result in loss of life among the sleeping thousands so imperiled. But collectively, as to the organized community, there is little room for sympathy, or for more than a sincere hope that the lesson twice enforced by disaster will be better heeded and future recurrence at least made improbable, not by blind faith in non-repetition, but by the adoption of effective and adequate restrictions and protection.

Thousands who have at times enjoyed visiting the pleasant little summer community will feel the most profound regret at the calamity which has overtaken it, but regrets, however sincere, will not remove responsibility.

The origin of the fire is obscure, and because by rapid progress and complete destruction, all traces have probably been obliterated, it is likely that it will never be known definitely. But the presumption that it was probably an avoidable cause will continue to exist.

Although the origin was not in a shingle roof, yet the rapid spread of the fire over so large an area was directly traceable to such roofs, brought almost to the condition of tinder by prolonged dry weather. *It is worthy of note that severe as the fire was, two cottages protected by spark-resistive shingles, provided a sufficient barrier to enable its progress to be arrested in one direction.*

Seven hotels, a rooming house, a 100-car public garage, a dance pavilion and bath house, 5 private garages, 16 dwellings and 10 mercantile structures, including the post office—with an estimated value of over $500,000 exclusive of contents—these constituted truly an impressive offering to lay on the altar of the "Red Terror."

Hampton Beach transgressed the rules of safety, and the way of the transgressor is (sometimes) hard, but Hampton Beach has pluck and energy, and we wish for a better constructed and safer resort long continued prosperity. It rests with Hampton Beach.

Meanwhile the one direction in which the Hampton Beach fire was checked by two houses with spark-resistive shingles is the single aspect of the conflagration that gives encouragement to those who are looking toward the spread of safer construction habits. It has been computed that during the 5-year period, 1915-1919, the United States suffered property losses of about $48,000,000, including those due to exposure, which were traceable to sparks on flammable roofs. Many beach-resorts are built almost entirely of frame, and present to flying sparks acres of dry-as-tinder ordinary shingle roof. With such conditions entirely unremedied by law or by the unenforcement of existing regulations, it is easy to understand why we have the horrifying annual totals of fire loss that we do.

But it is not easy to see why these annual losses do not stimulate action against the shingle roof, especially when there are commercially available shingles treated so as to make them spark-resistive and flame-resistive, even when located in the midst of non-resistive shingle roofs. Some fire-resistive shingles, in addition to their safer quality, are also practically proof against decay and corrosion from exposure.

Chief C. A. Gasser of the Bureau of Combustibles and Fire Risks, Newark, N. J., discussing spark-dangers in *The Fire Engineer,* says: "No combustible resting places are more dangerous than the shingle roofs of dwelling houses. No conflagration of recent times would have been one tithe so appalling if it had not been for the shingle roofs.

"A shingle roof town is like a man with an incurable disease. A shingle roof is the shadow of disaster. The greatest spark danger of all lies in the sparks from a burning building.

"The time to prohibit shingle roofs is right now and the best way to go about it is to have the building department discourage the practice. No permits for building should be issued if shingle roofs are to be used."

States Having Safety Statutes or Codes

Prepared by G. E. Sanford

Safety Engineer, General Electric Company, West Lynn, Mass.
President, American Society of Safety Engineers

STATES *Data Revised to March 1, 1921*	Building Strength	Exits	Floor Openings	Lighting	Fire Alarm	Construction	Ladders	Window Cleaning	Yards	Elevators	Cranes	Power Transmission	Power Control	Electricity	Gas	Ventilation	Boilers	Steam Engines, Etc.	Abrasives and Buffing	Woodworking	Logging	Mach. and Hand Tools	Explosives	Chemicals	Paper and Pulp	Textiles	Ceramics	Steel	Paints	Quarries	Refrigerating Machinery	Laundry Machinery	Compressed Air	Foundries	Food Products	Dredges
Alabama		a												b																					
Arizona																																			
Arkansas																																			
California			c	c				c		c	c	c		g	c		c	c	c	c	c		c			c			c			c		c	
Colorado		a	a							c		x					x																		
Connecticut		a								a		a		b			a		a																
Delaware		a																																	
Florida																																			
Georgia		a																																	
Idaho		a												b																					
Illinois		a	a			a						a		b	a	a			a																
Indiana		a	a							a		a					a		a																
Iowa		a										a		b			a		a																
Kansas		a										a		b																					
Kentucky		a										a																							
Louisiana		a				a																													
Maine		a										a																							
Maryland		a				a											a																		
Massachusetts		x	c	a		c				c		x		a			x		a	c			c			a		c		a		c	c		
Michigan		a	a			b						a	a	b		a			a																
Minnesota																	a																		
Mississippi												a																							
Missouri		a	a	a		a						x							a																
Montana														a																					
Nebraska		a												b					a																
Nevada														f																					
New Hampshire		x	c							c		c							c																
New Jersey	a	c		c	c	a				c	a	c	c	b		c	a	a	c	c			c							c			c	c	a	
New Mexico																																			
New York		c	x	x	c	x	c	c	c	x	c	c				c	c		c	c		c			c			c			c		c	c	c	
North Carolina		a																																	
North Dakota		a																																	
Ohio	c		c		c					c		c				c		c	a				c			c		c						c	
Oklahoma		a		a		a				c		c							c	c						c			c			c			
Oregon			a	a		a				c		a		f					c																
Pennsylvania		a	c	c	a	c	c		c	c	c	c	c	d		c	c	x	c		c	c	c	c		c						x	c	c	
Rhode Island		a								a																									
South Carolina																																			
South Dakota		a																																	
Tennessee		a										x																							
Texas		a																																	
Utah			c	c								c		b					c							c						c			
Vermont		a										a																							
Virginia		a										a							a																
Washington	a	a										c		a					c																
West Virginia		a																																	
Wisconsin	c	c	c	c		c				c	c	c		d			c	c	c	c		c			c	c						c			c
Wyoming		a																																	

a Statute. *b* Public Utility Code. *c* Industrial Code. *d* Public Utility Code and Industrial Code. *x* Industrial Code and Statute. *f* Statute and Public Utility Code. *g* Statute, Public Utility Code and Industrial Code.

EDITORIAL

EFFICIENT EQUIPMENT FOR INDUSTRIAL LIGHTING

THE importance of lighting, with its proper installation if artificial, and its inclusion in the original plans of all industrial buildings, cannot be overestimated. Technical societies in all branches of industry are giving increasing attention to this subject. Many articles from the proceedings of these societies appear from time to time in technical periodicals, and receive wide attention from even non-professional readers, for the idea of proper lighting arrangements has been sold thoroughly. How to accomplish the accepted standard is now the question.

In publishing the condensed report of the Lighting Sales Bureau of the National Electric Light Association, SAFETY ENGINEERING feels that it is presenting to its readers an authoritative treatment of the advances made during 1920-1921 in the education of the industrial and business public to the efficient use of lighting equipment. The report of activities of the Educational Exhibit Committee is of particular interest, as it shows the general interest on the part of the public throughout the United States in the establishment of permanent industrial lighting demonstrations.

A further step to secure the best possible results from either artificial or natural light arrangements is to paint shop interiors so as to give the greatest reflective surface while avoiding glare. The articles by Gardner Tillinghast and Archibald C. Reid in this issue present the opinions of two representative organizations in paint manufacture on how the results desired from paint are to be obtained.

FIRE-RESISTIVE COUNTRY HOMES

"WEEK-ENDING" in the country is a favorite summer sport—and 99 per cent of country homes are of frame construction. Many of these homes are miles from any fire department, paid or volunteer. Few of them have any special water supply. Many are without even chemical extinguishers.

Wooden shingles and clapboards are supposed to make a house look "homey." And, quite often now, the automobile is housed under the same roof.

All cordial invitations to Fire! If houses are pointed out in the neighborhood which have stood a century or more without even a lightning rod, luck has been with them. It would be interesting to inquire where the contemporary habitations are—if they didn't burn too long ago to be remembered.

Visiting a friend, we mentioned our intention to build in the country only when we could afford steel beams, hollow tiles and metal lath. He showed the usual attitude when he said "Put on plenty of insurance and, in case of fire, jump out the window."

The complete indifference to the probability of fire is due to a lack of knowledge of conditions and their remedy.

It is true that flammable contents constitute a great danger in country homes, but such fires originate within; with fire resistive walls they can be more easily controlled, and, at the worst, give time for escape.

Is not the idea of insurance miscon-

strued by many persons? Do they not feel that a big insurance policy acts as a charm to prevent fire, somewhat like the Chinaman who jumped for fun from a railroad train because he wore a "Safety First" button?

When brick and steel and concrete approach wood in cost they should be used. If wooden exteriors are essential to the happiness of the occupants, clapboards have been nailed to hollow tile.

BUILDING CONVERSION DANGERS

ONE of the largely contributing elements of excessive fire loss, even in cities with building ordinances, is the common practice of constructing in full compliance with law a building for one declared purpose or occupancy and, soon after completion, "converting it" to an occupancy for which, if declared at the time of erection, the structure as erected would have violated the ordinances.

One phase of this violation of faith prompted the following in the *Boston Herald:*

> New legislation is needed in Boston to prevent abuse of garage privileges. As the law stands today, a man may build a garage for his pleasure vehicle, quite an inoffensive structure. Then, through change of ownership or change of purpose, it may be converted into a truck garage or a repair shop; and those offended have no redress. At least that is the view of Boston street commissioners.
>
> It's up to the council.

Not only converted garages, but also converted storehouses and dwellings carry far in excess of the weights contemplated in construction, and lack the structural safeguards demanded in new construction for their present uses.

PERSONAL RESPONSIBILITY

IN the case of Clarence Jaquith vs. Western Colorado Motor Sales Company, the Colorado Supreme Court has handed down a decision affirming that the posting of a sign by a public garage owner to the effect that said garage owner will not be responsible for the loss of automobiles in case of fire does not relieve such garage owner of liability or constitute a defense at law against a claim for remuneration if it be established that the fire was due to or caused by negligence of the garage owner.

The importance of this decision in the event that it is sustained as a precedent by the courts of other States in similar cases will be readily appreciated as establishing that liability under common law or statute cannot be waived by mere disclaimer on the part of one party to the transaction and as establishing also a right of subrogation on the part of insurance companies in case they pay under similar conditions, all of which may be set down as a victory for "personal liability."

PROTECTION OF METAL SMOKESTACKS

To the Editor of SAFETY ENGINEERING:

SIR: In the June number of SAFETY ENGINEERING appears an interesting article by C. E. Worthington, with especial reference to ignition of combustible material by heat-producing apparatus. Mr. Worthington's article is an excellent one, and we are particularly interested in his logical analysis of the problem as regards the function of the air space contained or at any rate limited by other materials.

We would like to ask if there is available any additional data as regards the proper proportion of the different parts of the hood and collar arrangement for the protection of metal smokestacks. Fig. 1 gives the details of such a stack protection arrangement, but these dimensions are given only for a 6-in. stack. Our experience seems to have been that

the protection of small stacks, or what might be called in ordinary language, "stove pipes" can be readily taken care of, but when we get into stacks of large size, say 2 ft. or 3 ft. or more in diameter, there is always a question as to how much space is needed. The purpose of this letter is, therefore, to bring this matter to your notice to ask if you have any information as to the proportions which these dimensions should take in case of a large flue or stack. It seems obvious that although the clearance for 6-in. stacks should be at least 6 in., it also seems equally obvious that the clearance for a 6-ft. stack would not need to be 6 ft. to keep the same proportion.

HUTCHINSON, RIVINUS & Co.
Philadelphia, June 29.

In forwarding the full table to the inquirer, Mr. Worthington observes:

"There are restrictions as to fuel and 6 in. is quoted as the irreducible minimum space. If enlarged, all other dimensions should be correspondingly enlarged and especial care taken that the distance from top of collar to umbrella is such that the total area of outlet is about 150 per cent of cross section area of air space, the same proportion to be observed in distance from umbrella to roof.

"The tabulation was stopped at 6 in., because we were unable to get stack temperatures; that is, of the stack inself, not the interior smoke and gas column, in excess of 800° on any stack serving a return flue or water tube boiler furnace, and 6 in. suffices for that temperature with a good factor of safety. True, the *volume* of heat from a large stack exceeds that from a smaller, but the *radiation per square inch* of surface does not appear to increase, the increased area compensating.

"In fact, small stacks with 'reducers' at base give highest temperatures. Where over 40 per cent of wood is used for fuel probably increase of space, or preferably a double collar is desirable, and always on the stack of a direct flue or locomotive type boiler.

"Ordinarily, no good reason exists for a greater space about a 24-in. or 36-in. stack or larger than about a 12-in., especially as reducers are rare on large stacks. The main trouble will be found in failure to sufficiently enlarge the outlet.

"A very important feature is the usual impracticability of providing an opening greater than 5 ft. in diameter through a roof, particularly the ordinary joist supported roof, without endangering the structural stability of the roof itself. In fact, few roofs admit of 5 ft.

"It is not usually wise to carry more than 4 joists on a header; more generally the limit is 3; more than that means supports and reinforcement that are expensive and inconvenient, obstructing movements on the floor. Therefore, to be practical, we must 'cut our coat according to the cloth' as far as safety permits. Impairment of strength of roof invites accident.

"The galvanized collar reflects heat and is really much more effective than a 4-in. hollow tile enclosure, even with a 4-in. air space, probably nearly equal to 8 in. of tile, without space.

"A very simple test of dangerous heat is to hold a 'strike anywhere' match in contact for 3 minutes; if it ignites without friction within that period the heat is too great, if a safety 'strike on the box' match ignites, the heat approaches the point of danger to wood by long and poorly ventilated contact. In either case material subject to decomposition at 200° or less should be kept away.

"I might add that, because of the same suspicion of possible inadequacy, we placed double collars on some large power-house stacks, expecting to develop maximum heat; but they appear to have been needless."

Safety News and Comment

Waste in Industry Reports

THE complete report of the Committee on the Elimination of Waste in Industry of the Federated American Engineering Societies, of which a summary was presented to the Executive Board at St. Louis, June 3, is to be printed in book form. It is hoped that it will be ready for general distribution about September 1.

Due to the heavy expenses of making this investigation each separate part of the report is being furnished, before the entire compilation is ready for book publication, at prices averaging $5 per report. The entire set costs about $100.

Research reports by authorities include: Unemployment, Strikes and Lock-Outs, Legal Machinery for Adjusting Disputes, Industrial Accidents, Health of Industrial Workers, Eyesight Conservation, Sales and Purchasing Policies.

Field investigations reported are: Building Trades, Men's Ready-Made Clothing, Shoes, Printing, Metal Trades.

Each report is given in full and contains all sustaining data. The reports average from 5 to 12 thousand words. Many of them contain charts and tables.

All reports are to be ordered from James T. Grady, Publicity Director, F. A. E. S., Room 101, 29 West 39th street, New York City.

Pennsylvania Industrial Conference

A PRELIMINARY outline of the program for the Industrial Relations Conference in Harrisburg, Pa., under the auspices of the Pennsylvania Department of Labor and Industry, on October 24, 25, 26 and 27, is as follows:

Opening Session, 8 p. m., Monday, October 24. Address by Governor.

Tuesday Morning, October 25. Subject: *Industrial Waste*—Unemployment, Industrial Disputes, Accidents and Sickness, Hiring and Firing (Industrial Turnover), Other Causes.

Tuesday Afternoon, 2 p. m. Subject: *Women and Children in Industry.*

Tuesday Evening. Subject (Public Session): *Industrial Co-operation.*

Wednesday Morning, October 26. Subject: *Industrial Co-operation.* The four factors in industry—The Employer, the Employe, the Public, the Government.

Wednesday Afternoon. Subject: *Industrial Education* (Education for a better job). The Public School, the University or Technical School, the Plant School, the Labor Union School, the School for Training of Women Workers.

Wednesday Evening. Subject: *Present Industrial Situation.*

Thursday Morning, October 27. Subject: *Industrial Publicity.* The Daily Newspaper, the Industrial Plant Magazine, the Industrial or Technical Periodicals.

Thursday Afternoon. Subject: *Medical Supervision in Industry.*

SAFETY EQUIPMENT EXHIBIT

In connection with the conference an Industrial Welfare Exhibit will be held in the Penn-Harris Hotel, October 24-28 inclusive. It will be open to manufacturers who wish to exhibit material relating to fire prevention and protection, safety devices, illumination, first aid, health, hygiene, and welfare.

The exhibit will be open to the public on Monday evening and will close Thursday night at 10 p. m. Exhibits must be in place by 6 p. m. Monday, and must not be removed until the above mentioned time on Thursday night.

Booths approximately 8 x 8 feet will be erected and decorated in a uniform manner. Heavy or bulky material cannot be accommodated, and no material can be attached to the floor or walls. The general illumination of the room is such that no individual booth illumination will be necessary. Arrangements can be made for electric current.

Janitor service, chairs, tables, etc., will be furnished free to exhibitors. Booths will be erected Monday morning so exhibits can be placed Monday afternoon. Booths 1-26 will be located in the ballroom of the hotel; numbers 35-48 will be located in the corridor leading thereto. Communications should be ad-

dressed to John S. Spicer, Director of Industrial Welfare Exhibit, P. O. Box 1131, Harrisburg, Pa.

High Voltage Transmission Lines

ON page 17, SAFETY ENGINEERING, July number, with reference to improved tools for work on live transmission lines developed by T. F. Johnson, Jr., and used in the J. G. White Engineering Corporation, a sentence was added to the paper of Mr. von Dannenberg to the effect that Mr. Johnson's tools were not available commercially. By an error this statement did not appear in brackets as a notation by the editor. Mr. von Dannenberg is not responsible for the sentence closing his article; this was an editorial addition on the authority of a statement by a member of the Publication Committee of the A. S. S. E., who received the impression that the tools mentioned were not on the market. We are now able to apprise our readers that they are on sale.

E. D. Bullard Dies Suddenly

WHILE driving home from an evening entertainment on July 15, accompanied by his wife, E. D. Bullard, senior member of the San Francisco firm of that name, was stricken with heart failure. The attack was without warning, and the car ran wild for a short distance after Mr. Bullard collapsed at the wheel. He died before the machine was stopped by running into a lamp post. As speed had been slackened at the time on account of a corner, the impact caused only slight injury to Mrs. Bullard.

Mr. Bullard was active in the movement to reduce industrial accidents and his influence and forceful work in that direction will be missed, especially on the Pacific coast. SAFETY ENGINEERING extends its condolences to the bereaved family and firm.

E. W. Bullard, junior member of the firm, who had accepted the invitation of the United States Bureau of Mines to be one of the judges at the International First Aid and Mine Rescue Contest, to be held in St. Louis Sept. 1-3, and was to leave San Francisco in the early part of August for the East, has canceled his trip as a consequence of his father's death.

Lightning Fires and Protection

"LIGHTNING annually kills more people than the railways, and causes a property loss of over $8,000,000 in this country," says the Wisconsin Industrial Commission, urging the proper installation and the regular inspection of lightning-rods.

Wisconsin alone in 1920 had 232 lightning fires, with a property loss of $958,925; these were in unprotected buildings. There were also 14 such fires in poorly rodded buildings, involving a loss of $64,185. An investigation of these cases showed defects in materials used, in insulation, or in both.

The more common defects were lack of grounding to permanent moisture, insufficient number of points, lack of points at chimneys, cupolas, ventilators, spires, gables, dormers and other elevations, using too light materials, joints and connections not mechanically and electrically firm and secure, failure to connect down spouts, carrier, door tracks and other exterior metal parts with the rodding system, running metal clothes lines from trees to buildings (two cases), building silos and other additions without extending the rodding system, rusting, corroding and breaking of conductors, only one ground rod.

If the system is of good material, properly installed, well grounded, and kept in repair, it is almost certain protection, and an inexpensive guarantee of safety to life and property.

Careful inspection by a competent man alone will reveal the defects in existing installations. Where manufacturers do not give this inspection service, it would pay farm mutual insurance companies and their policy holders to hire their own inspector. This is now being done by some companies.

Skyscrapers have been generally fortunate or else exceptionally well protected from lightning, but on the afternoon of June 28 the World's Tower Building near Times Square, New York, a 30-story structure, was struck. The terra cotta cornice was torn to fragments which went crashing to the street, through a skylight into offices on the twenty-sixth floor, and through the roof of an adjacent low building at 104 West 40th street.

Meteorite Cause of Fire?

A METEORITE is said to have struck the corner of a barn in Stockbridge, Mass., igniting the structure in its passage and plunging into the ground nearby. Several persons claim to have seen a blinding flash and heard the sound of the impact. The barn was totally destroyed but the hole was saved. It had not been excavated at last accounts but an attempt was stated to be in contemplation to recover the meteor, which is to be placed in a museum. No declaration of purpose has been made in the event of its proving to be a woodchuck hole.

If this is finally proven as the origin by the recovery of a meteorite at the end of the hole it will be one of the very few authenticated records of such occurrences since the late conflagration in Sodom. (Or was it Gomorrah?) Neither of these cities are understood to have ever fully outlived their bad fire record so acquired.

It is not probable that this occurrence will be likely to bring about an increase of basis rates in the New England schedules, unless repeated.

Headlighting Devices Approved

THE Massachusetts Department of Public Works has issued a ruling that after August 15, 1921, to be operated at night in Massachusetts, all automobiles except motor trucks of 2 tons capacity or more, and also all motorcycles, must be equipped with glareless headlighting devices selected from the following list of 22 approved trade names: Bausch & Lomb, Brown Reflector, Conaphore Type F (colorless glass), Holophane No Tilt, Lee Knight, Legalite M III, Liberty Type D, Macbeth Type D, Patterson, Universal, Wills-St. Claire, Alpheco, Bi-Optic, Holophane, Liberty, National, Primolite Type B, Syndicate Type A, Violet Ray, Saferlite, Shaler Roadlighter, Fraetolite.

The regulations include requirements respecting focal adjustments, aim of beam, etc. Special attention is called to the fact that the Macbeth lens is not legal unless the name "Macbeth Type D" is moulded in the glass; the Legalite lens is not legal unless the name "Legalite M III" is moulded in the glass, and the Conaphore is not legal unless it is made of colorless glass and has the name "Conaphore Type F" moulded in the glass.

Safety Precautions for Farmers

"SAFETY Engineering on the Farm" is the title of a good all-around treatment of common farm dangers and their avoidance, in the July issue of *The Travelers' Standard*. The hazards treated are those associated with animals, falling, hand tools, power-driven machinery, plowing, harrowing and mowing, steam boilers, and windmills.

Motion Pictures in Lodges, etc.

THE following rulings were submitted in July to the Industrial Board of the State of Pennsylvania by a special committee appointed by Commissioner Connelley to assist in formulating regulations governing the exhibition of motion pictures in churches, schools, lodges and other similar places of public assembly.

1. Approval of Motion Picture Projectors.

All motion picture projectors shall be approved by the Industrial Board for use within the Commonwealth of Pennsylvania, in accordance with the method of procedure for the approval of such devices.

2. Permits and Licenses for Operators.

(a) All persons operating approved motion picture projectors in Churches, schools, lodges and other similar places of public assembly shall file an application for a permit.

(b) Applicants desiring to operate approved motion picture projectors designed for safety films only shall be granted a permit upon filing an application properly filled in and duly affirmed before a notary public or other person authorized to administer oaths.

(c) Applicants desiring to operate approved motion picture projectors designed for "standard films" only or "safety and standard films" shall file an application properly filled in and duly affirmed before a notary public or other person authorized to administer oaths.

Such applicants shall be granted a permit

upon completing satisfactorily an examination covering the particular type of projector to be operated.

(d) Applicants desiring to operate approved motion picture projectors for commercial purposes shall be required to take the regular examination for motion picture operators of theatres and similar places of public amusement.

3. Permit for Use of Building.

Every building in which motion pictures are exhibited shall be approved for such purpose by the Department of Labor and Industry and a permit be issued signifying the approval.

4. Definitions.

(a) A "Public Assembly" shall mean a gathering of persons in excess of 25 for the purpose of witnessing the projection of motion pictures.

(b) A "Demonstration" shall mean a projection of motion pictures for demonstrating purposes where not more than 25 persons are in attendance.

(c) An "Exhibition" shall mean a projection of motion pictures before a public assembly.

Mine Rescue and First-Aid

IN the past 10 years the Bureau of Mines has trained in mine rescue work and first aid methods nearly 51,000 persons.

The highest proportion of the miners employed in any one State who have received this training is in Washington, where of the 6,035 so employed, 1,784, or 29.56 per cent have been trained.

Slate Quarry Accidents

IN 1920, of 3,496 men employed in slate quarries, 364 were injured and 5 killed. These figures, reported to the United States Bureau of Mines, show a rate per 1,000 men employed of 1.49 killed and 108.2 injured, based upon a standard year of 300 working days. Of the total number of injuries, 224 occurred in and about the quarry pits, while 140 occurred at the outside rock-dressing plants. Of the accidents in and about the pits, 52 resulted from handling rock, 33 from falls or slides of rock or overburden, 19 from haulage accidents, 17 from machinery, 16 from flying objects, and 15 from falling objects. At the outside rock-dressing plants, 40 men were injured while handling rock, 29 by machinery, 20 by haulage accidents, 11 by hand tools, and 9 by flying objects.

All of the 5 fatal accidents occurred at Pennsylvania quarries, which produce about two-thirds of all slate quarried in the United States. Pennsylvania also suffered 272 of the 364 non-fatal injuries, followed by Vermont with 77 men injured.

Boston Apartment Fire

NOT long delayed after the re-enactment of the ordinance requiring sprinklers in certain Boston tenement houses was a demonstration of sprinkler efficiency.

On Sunday afternoon, July 17, fire broke out in a large "apartment" house on the Fenway, Boston. It was attributed to leaving an electrical appliance with the current on.

Three apartments were involved, with a total loss of about $3,000. Acting Fire Chief Driscoll and Deputy Chief McLean declare that the damage would have been much greater but for the automatic sprinkler system, the water from which kept the fire from invading the corridors even when the partitions were almost burned through.

Tally one for the automatic sprinkler in tenements, and add a large credit mark for the efficiency of sprinklers in corridors. The test indicated that these would have facilited and probably assured the escape of all occupants even had the fire advanced to a stage beyond that which it actually attained.

The wisdom of those Boston citizens who fought so long and earnestly against repeal has been vindicated.

Fewer Mine Fatalities

FOR each 1,000 men employed in the coal and metal mines of the United States in 1911, there were 4.71 fatal accidents. In 1919, this rate per 1,000 had been reduced to 3.23. This was a decrease in fatal accident frequency of over 31.42 per cent since the creation of the United States Bureau of Mines, which followed the 15

disastrous accidents involving heavy loss of life in coal mines during 1911.

Current statistics from the Bureau of Mines give the number of fatalities in coal mines in relation to millions of tons of coal produced rather than per thousand men employed. The average number of lives lost during the month of May of each year, 1913-20, has been 176, which is a fatality rate of 3.76 per million tons of average production.

During the first 5 months of 1921 the total coal mine fatalities reached 806, a decrease of 7.8 per cent from the same period in 1920, but an increase per million tons of coal mines from 3.57 in 1920 to 4.01 in 1921.

Paper Plant Reduces Accidents

THE Marathon Paper Mills Company of Rothschild, Wisconsin, has announced a decrease both in number of accidents and number of days lost during the first quarter of 1921 from the corresponding period for 1920, The decrease in number of accidents is 10.71 per cent, and that in days lost 34.32 per cent. The safety organization of the company is proud of this decrease, and has issued an appeal to employes to continue it.

Suggestions for accident prevention in the April issue of the *Marathon Runner* include the following:

"Construction crews should be made aware of the existence of the 'safety first' principle. New men are to be found in the construction crew. Make sure that they know our desire to make this the safest mill in the country.

"The new work, especially the installations in the sulphite department, will require special care. Be sure to use goggles in chipping; be sure to use chisels that are in good condition and be sure to use the chisel holders to avoid being struck by the sledge.

"Scaffolding should be carefully examined and the utmost care should be taken to avoid infection from slight injury."

Discounting Premiums by Prevention

THE Compensation Department of General Accident of Philadelphia devotes its section in the May issue of *The General's Review* to the instruction of selling agents as to the exact basis of rate reductions allowable under the Schedule and Experience Rating Plans for safety organization on the part of the assured manufacturer. The Engineering Department of General Accident is equipped to assist clients in starting their safety organizations.

The discounts allowed under the schedule Rating Plan to premiums of $450 up, are as follows:

For *full safety organization* (combined supervision, inspection service and education)	5%
Supervision	1%
Inspection Service	2%
Education	½%
For *hospital:*	
First Aid Kit	1%
Dispensary, with Nurse	3%
Emergency Hospital	5%
For loss cost test:	
Reduced loss cost resulting from effective safety organization (maximum credit)	10%

Under the Experience Rating Plan, which applies, without exception, to all risks which qualify under its provisions, a plant which has had a costly accident record will produce a *charge* and the rate will be increased. A risk is subject to experience rating if it has produced during the experience period a premium, based upon manual rates, of $450. The experience period corresponds with the period during which the risk has been insured for workmen's compensation insurance and terminates six months prior to the expiration or anniversary date of the current policy. The minimum period is one year and six months, and the maximum period three years and six months.

"Put the New Man Wise"

ONE per cent of safety education, Mr. Harold Harty of the foundry department of the Anaconda Copper Company thinks, lies in the safety meeting, and 99 per cent in the hands of all the older men outside. "Therefore put the new man wise to all the wrinkles; show him how to avoid the little accident that happened, or nearly happened, to yourself on one or more occasions; don't jeer at his clumsy efforts

or laugh at his narrow escapes—remember there was a time when you, yourself, were not by any means as smart a guy as you imagine you are now. Don't worry that through your advice he may become a better man than you, and that the company may reach the same conclusion; if he is, neither you nor your efforts will prevent him from going ahead—so forget it!"

Gas and Electric Hazards

THE Rochester, N. Y., Gas & Electric Corporation is conducting a window-display exhibition made up by the safety-first department, of which F. W. Fisher is director.

The display shows the dangers of broken street lamps; of allowing electric irons to become overheated; of climbing light poles or touching wires, and of smoking while filling a tank with gasoline. The gas masks, gloves and shoes for ladders to prevent slipping, all used by men working for the corporation, are shown. A means of resuscitation from electric shock is illustrated by photograph. The prone method is used, the same one that is used in getting water from the lungs. One part of the display is used to emphasize the necessity for having flue connections on gas-fired water heaters to carry off waste and poisonous gases.

Sea Safety Rules Too Rigid

GREAT BRITAIN is seeking the support of the United States in an effort to relax the rules adopted at the International Conference in 1914 governing the safety of the lives of passengers at sea. Recommendations that this government join in the movement already have been made, the British claiming that the rules adopted after the *Titanic* disaster are too rigid. The British, it is said, are concerned principally with the rules affecting the construction of bulk-heads, which they claim should be so revised as to allow additional cargoes to be placed on passenger ships.

Safety for Gas Plant Employes

THERE are two classes of risks to which the employes of gas companies are constantly subjected—risks of explosion and risks of asphyxiation. The customers of the companies are also subject in lesser degree to these same hazards.

Frank Batt, Gas Engineer of the Central Illinois Public Service Company, writing for the *Safety Bulletin*, May, 1921, says that of the safety measures advisable in gas plants and on gas distribution systems, the following precautions are most important: "Smoking in gas plants should be stopped, except in the retort house. All equipment should remain open for an hour or two before being entered. All apparatus should be examined once a day and cleaned if necessary. Gas masks should be used in heavily charged atmospheres. All equipment, mains, services and house-piping should be tested before gas is finally passed through them."

Maryland to Have Health Experiment

AN IDEAL health administration to be instituted in some county not yet decided in Maryland is a project under development. It is to be financed co-operatively by the United States Public Health Service, the Maryland State Department of Public Health, Johns Hopkins University School of Hygiene and Public Health, and the Rockefeller Foundation International Health Board.

Similar demonstrations are projected for other parts of the country. Final arrangements have been made for one on Cape Cod.

Health Legislation Summaries

BI-WEEKLY mimeographed summaries of national legislation concerning public health have been issued by the National Health Council since last March, when Congress convened in special session. These summaries list and abstract all new health legislation and also report progress on bills previously outlined. The first eight statements, covering the period from

March 4 to July 7, 1921, have listed about 80 bills dealing with some phase of public health. Forty-four of these have been discussed at length and their progress carefully followed. Arrangements have been made to distribute copies at 20 cents apiece. The summaries are prepared in and can be secured by addressing the Washington office of the National Health Council, 411 Eighteenth street, N. W., Washington, D. C.

Building Construction Hazard

SAYING that large cylindrical columns of concrete are provided in many factory buildings for supporting the floors and the loads that are to be imposed on them when the buildings are completed, the Travelers Insurance Company comments:

These columns may be 2 feet or more in diameter, when finished, and the openings left for them in the floors, before the concrete is poured, are of corresponding diameter. Several men were injured, on a building recently erected, by falling into some of these openings which had been left unguarded. It is plain that a fatal accident might easily result in this way.

The prevention of such accidents appears to be a simple matter. A square inclosure, composed of four posts, two sets of rails, and a toe-board, can be erected with little trouble or expense. An inclosure of this kind should be provided for every floor opening, and when the columns have been poured at one floor level the inclosures may be transferred to higher levels, to be used in a similar manner and for the same purpose.

All floor openings should be guarded at least as effectively as here described, but in many cases the inclosures should be stronger and of more permanent character, and should be secured so that they cannot be displaced or removed easily. The toe-boards should not be omitted, especially when the conditions are such that persons working at lower levels might be struck by objects falling from above.

Small Caliber Rifles

THE Supreme Court of Louisiana has officially classed 22- and 25-caliber rifles as toys and not dangerous weapons, in a ruling contesting the State law imposing a license tax on retail dealers in pistols, cartridges, etc., as discriminatory because it exempted dealers in rifles of the calibers named.

Strikes of 1920 in Pennsylvania

THE annual report for the year 1920 of the Pennsylvania Bureau of Mediation and Arbitration has been published recently as Bulletin of the Department of Labor and Industry, vol. 8, series of 1921, no. 3.

The strikes reported to the Bureau of Mediation and Arbitration reached a total of 555, and involved a loss of $14,514,195 in wages, not including the salaries lost by employes of the railroads who participated in the walk-out of April, 1920. The Bureau claims to have averted more than 100 additional strikes.

While this total of strikes is greater than for any other year in the history of the State, as is the total of wages lost, yet the man-days lost in 1919 were more than those lost in 1920. In number of strikes the textile trades led with 139 and the metal trades held second place with 88. The largest total of wages lost, $4,753,033, was in metals, and the totals next largest, in the order named, were in mines, textiles, building, clothing, public service, and lumber strikes.

Of the reported causes of strikes, conditions of work were involved in 98 of the 555, and were the sole cause of 29. In combination with wages, they caused 39; with union, 6; with hours and union, 1; with wages and union, 4; and with wages, hours and union, 19.

New Management Journal

THE first issue of *Management Engineering, The Journal of Production,* appeared in July, edited by L. P. Alford, chairman of the Management Section, American Society of Mechanical Engineers, and published by the Ronald Press Company, New York. The policy of the new periodical is to present practical working aids to the operation of productive enterprises, of a quality to exert a constructive influence in industrial management.

The Editorial Council formed for the new publication comprises 23 authorities in the management of industrial concerns.

An innovation in the common practice of indexing technical journals has been made in conforming to the system of

classification used by the Engineering Societies' Library of New York, even to having the actual work of indexing done by the staff of that library.

The initial issue contains articles by E. S. Carman, James F. Johnson, Wallace Clark and C. E. Davies, W. L. Churchill, C. E. Knoeppel, G. Charter Harrison, Sanford E. Thompson, C. B. Auel, Collins P. Bliss, Harrison W. Craver and others.

Children Killed in Streets

DURING 1919, there were accidentally killed in Chicago and Cook county, 499 children under 16 years of age. In St. Louis, the teaching of safety to school children has materially reduced accidents to the children, and in Detroit a reduction of approximately 50 per cent has been made in such accidents.

Results of Safety in Syracuse

SYRACUSE, N. Y., has reduced its accidental death rate to 36.4 per 100,000, with only one year of organized safety effort. The city is especially proud of this figure in contrast with that of its neighbor, Rochester, with 44 accidental deaths per 100,000, after three years' safety organization.

Connecticut Smoke—and Smokers

"THE largest original cause of fire is that of matches-smoking with its toll of $1,272,262," according to an analysis of fire losses of Connecticut for the 5-year period 1915-1919 recently completed by the Actuarial Bureau of the National Board of Fire Underwriters.

"This State during the years 1915 to 1919, inclusive, paid $15,151,129, or a yearly average of $3,030,226, for the indulgence of its costly habit of playing with fire. If the huge 5-year total of $15,151,129 could have been used instead of wasted, it would have built 3,030 houses at $5,000 apiece (sufficient to furnish homes for 15,150 people, or more than the population of Willimantic), or it would build 1,515 miles of good macadam roads" at a cost of $10,000 per mile.

Exposure, not an original cause, is the stated cause of the greatest loss, $1,815,089. Next comes (2) matches-smoking, then (3) electricity, (4) stoves, furnaces, boilers and their pipes, and (5) defective chimneys and flues.

Fire-safe Wooden Houses

AT Underwriters' Laboratories in Chicago a new method of fire-delaying construction for frame houses is being developed.

The new system utilizes a covering of metal lath and plaster, held in place by wires surrounding the beams, which continue to act even after the wood beams have started to char.

Wharton Clay, of the National Federation of Constructive Industries and the National Congress of Building and Construction Industries, says:

"From the results of this test it is practically assured that houses can be constructed with practically no extra expense which will stand intensive fire for one hour and keep the family and property safe from destruction. The new method is spoken of as fire-safe wooden construction, and is a wood frame so protected by metal lath and plaster that the lives of the occupants of the building would be safe against the effects of fire. Thirty minutes is the least time that should be allowed for complete safety, but a protection of one hour is being sought after by fireproofing engineers."

Petroleum Loading Racks

CONTINUING the discussion of petroleum industry safety orders, the *California Safety News* presents illustrations supplied by oil companies showing the right and wrong types of railings, gangplanks, stairways and riser and swing pipes. The State Department of Safety solicits photographs and criticisms of petroleum loading equipment.

"American City" Uses Fire Reports

THE *American City* for June, in an article entitled, "Don't Burn Up Your Public Buildings," has made use of the special reports made to SAFETY ENGINEERING by officials of Fire Departments throughout the United States and Canada.

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

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Regular Meetings—Fourth Friday of Each Month from September to June at 8 P. M. Next Meeting September 23.

Tentative Draft of Ladder Safety Code

THE following draft of the Ladder Safety Code is the second revision, and is still tentative. The first draft was prepared by M. C. Goodspeed, electrical engineer, of the General Electric Company. The revision has been in the hands of the Ladder Code Committee, of which C. N. Young is chairman. The other members of the working committee are A. E. Davidson, Wm. Newell, Peter C. Spence, Thomas A. Walsh, H. G. Wiberg, W. E. Welch and M. C. Goodspeed.

In publishing the draft in this tentative form, the Code Committee expresses its desire to obtain the widest possible expression of opinion from all persons interested. Thus the code can be in the best possible form when submitted to the Sectional Committee for its verdict. Constructive written criticism will be especially welcome, and will be made the basis of further consideration and revision. Such criticisms may be addressed to Mr. Charles N. Young, Chairman Ladder Code Committee, American Society of Safety Engineers, Room 804, Mills Building, Washington, D. C.

SECTION 1. GENERAL REQUIREMENTS

10. *Scope, Application and Compliance.*

(a) Scope. The rules set forth in this Standard shall apply to every establishment or working condition which by reason of the nature of the condition, operation, or process requires the use of the equipment covered by these rules.

(b) Application. The employer shall furnish suitable equipment for the condition, or work to be performed. Employes shall use equipment, when employed under conditions, or for work, which requires same.

(c) Compliance. The method to be pursued to assure that "ladders" which meet the specifications and tests prescribed by these rules will be used, shall be determined by the proper administrative authority.

The word "SHALL," where used, is to be understood as mandatory, and "SHOULD" as advisory.

11. *Purpose.*

The purpose of this code is to provide reasonable safety for life, limb and health. It shall be liberally construed to secure these results, by the enforcing officers or body, who shall have authority in special or unusual cases to grant exceptions from the literal requirements of this code, so long as equivalent protection is thereby secured. Where specific devices or methods are mentioned in this code, other devices or methods, which will secure equally good results, may be used, subject to the approval of the enforcing officer or body; such approval shall, where necessary, be based on tests made by an unprejudiced institution of recognized standing, with final appeal to the U. S. Bureau of Standards.

NOTE—To secure the uniform application of this code, enforcing officers are urged to consult the American Society of Safety Engineers or the American Engineering Standards Committee, both at 29 West 39th street, New York, before rendering decisions on disputed points.

SECTION 2. DEFINITIONS

20. A ladder is an appliance of wood, meta., rope or a combination of these materials. In its most simple form a ladder consists of two side pieces called side rails, joined at short intervals by cross pieces, called steps.

(a) The term FIXED ladder shall mean a

ladder substantially fastened to a structure in a fixed position.

(b) The term PORTABLE ladder shall mean a ladder, consisting of but one section and which may be used at various locations.

(c) The term EXTENSION ladder shall mean a ladder consisting of two or more sections traveling in guides or brackets so arranged that it may be adjusted to variable lengths.

(d) The term FIRE ladder shall mean a ladder used exclusively for fire purposes, excluding equipment of organized Fire Departments.

(e) The term STEP ladder shall mean a ladder having flat treads and so constructed as to be self-supporting.

(f) The term TROLLEY ladder shall mean a ladder traveling on fixed horizontal guides.

(g) The term SECTIONAL ladder shall mean a ladder consisting of two or more sections so constructed that the sections, when combined, will function as a single ladder.

(h) The term "A" ladder or TRESTLE ladder, shall mean a ladder consisting of two (2) portable ladders hinged at the top to form equal angles with the base.

(i) The term EXTENSION TRESTLE ladder shall mean a ladder consisting of an "A" or TRESTLE ladder with an additional parallel side portable ladder, which is adjustable perpendicularly and is provided with a device to lock it into place.

SECTION 3. MATERIALS

30. *Wood Side Rails.*

(a) Wood side rails shall be of straight grained material, thoroughly seasoned, and free from serious structural defects. Knots shall not exceed one-half (½) inch in diameter, and shall not be nearer than one-half (½) inch to the edge of the side rail or three (3) inches to the rung.

(b) Wood side rails shall be dressed on all sides and sharp edges eliminated.

(c) Wood side rails shall be of red spruce or the equivalent thereto in strength. The following woods may be regarded as equivalent:

Common Name	Botanical Name	Weight Seasoned Lbs. per Cu. Ft.
Conifers—		
Cedar, Port Orford	Chamaecyparis lawsoniana	31
Cypress, yellow (Alaska)	Chamaecyparis nootkatensis	28
Cypress, bald	Taxodium distichum.	30
Fir, Douglas (Pacific coast type)	Pseudotsuga taxifolia	34
Larch, western	Larix occidentalis	36
Pine, Cuban	Pinus heterophylla	45
loblolly	Pinus taeda	38
longleaf	Pinus palustris	42
Norway	Pinus resinosa	34
shortleaf	Pinus echinata	38
western (Idaho) white	Pinus monticola	29
Spruce, red	Picea rubens	28
Sitka	Picea sitchensis	26
Hardwoods—		
Ash	Fraxinus	34-44
Beech	Fagus atropunicea	44
Birch	Betula	35-45
Chinquapin, western	Castanopsis chrysophylla	31
Elm	Ulmus	35-44
Hickory	Hicoria	42-53
Maple, Oregon	Acer macrophyllum	34
red	Acer rubrum	37
sugar	Acer saccharinum	43
Oak	Quercus	41-49

31. *Wood Steps.*

(a) Wood rungs, treads or cleats shall be of straight grained material, thoroughly seasoned, free from knots and structural defects.

(b) Wood treads shall be of material permitted for side rails, rule 30.

(c) Wood rungs or cleats shall be of white ash or the equivalent thereto in strength and wear. The following woods may be regarded as equivalent:

Common Name	Botanical Name	Weight Seasoned Lbs. per Cu. Ft.
Ash	Fraxinus	40
Beech	Fagus atropunicea	44
Birch, sweet	Betula lenta	45
yellow	Betula lutea	44
Elm, cork	Ulmus racemosa	44
Hickory	Hicoria	48-53
Locust, black	Robinia pseudacacia	48
honey	Gleditsia triacanthos.	42
Maple, sugar	Acer saccharinum	43
Oak	Quercus	44-48

32. *Metal Parts.*

All metal parts or fittings of ladders shall be mild steel, wrought iron, or malleable cast iron, unless otherwise specified in this code.

SECTION 4. TESTS

40. *Strength.*

The following test should be applied to portable and extension ladders to insure adequate rigidity and proper construction. Rail sections should, if necessary to pass these tests, be increased above the minimum specifications provided by this code, which are given as absolute minimums rather than as an expression of the best practice.

With each side rail supported horizontally three (3) inches from each end, the ladder should retain a static load of two hundred (200) pounds for ten (10) minutes, with a maximum deflection not greater than shown by the following table, and without taking a permanent set or developing cracks or other defects.

Length of Ladder in Feet	Deflection in Inches	Length of Ladder in Feet	Deflection in Inches
12	2	32	19
14	3½	34	21
16	5	36	23
18	6½	38	25
20	8	40	27
22	9½	44	32
24	11	48	36
26	13	52	40
28	15	56	44
30	17	60	48

SECTION 5. SPECIFICATIONS

50. *Side Rails.*

(a) Side rails shall have a minimum cross section as specified in paragraph (d) below, or as specifically covered in "Construction of Ladders," Section No. 6. Different dimensions may be used if at least of equal strength to the section given in the tables, as calculated by formula given in paragraph (d) below.

(b) Weight of side rails should be not more than two and one-half (2½) pounds per foot of length.

(c) The inside width between side rails shall be not more than thirty-two (32) inches and not less than ten (10) inches at a point not more than four (4) feet below top end of side rail. Top end of side rails may be brought together. With spread rails the minimum rate of spread shall be one-quarter (¼) inch at each succeeding step.

(d) Wood side rails shall have a thickness not less than is prescribed in this rule and shall develop a working stress, S, not exceeding 1250 lbs. per square inch when tested by the following formula applying to rectangular sections.

$$S = \frac{3\ PL}{2\ BD^2} = \frac{37.5L}{B\ D^2}, \text{ where}$$

P = 25 lbs., which is the normal component on each rail of a load of 200 lbs. at center of ladder, equally distributed between the rails, when foot of ladder is moved out of the perpendicular by one-quarter (¼) of its length.

L = length of ladders, in inches.

B = thickness of each side rail, in inches.

D = depth of side rail, in inches.

Wood side rails shall have a minimum center cross section of the following dimensions, unless otherwise specified in this code:

Side Rails Length in Feet	Dimensions of Side Rails at Center in Inches
Up to and inc. 19	1⅛x2½
Over 19, up to and inc. 23	1⅛x2¾
Over 23, up to and inc. 26	1¼x2¾
Over 26, up to and inc. 30	1¼x3
Over 30, up to and inc. 34	1⅜x3
Over 34, up to and inc. 40	1⅜x3¼
Over 40, up to and inc. 44	1½x3¼
Over 44, up to and inc. 50	1½x3½
Over 50, up to and inc. 54	1½x3¾
Over 54, up to and inc. 60	1½x4

(e) Wood side rails of cleat ladders shall be not less than three-eighths (⅜) inches greater in thickness and one-half (½) inch greater depth than is specified under paragraph (d) above.

(f) Metal side rails shall be of medium soft steel or wrought iron not less than three-fourths (¾) of a square inch in cross section with a minimum thickness not less than three-eighths (⅜) inch or equivalent thereto in strength.

51. *Steps.*

Steps may be either rungs, treads or cleats. A uniform step spacing shall be used. This spacing should be twelve (12) inches. Steps shall have the following dimensions or be of equivalent strength:

(a) Rungs.

(1) Wood rungs shall have the following minimum dimensions.

Rung Length in Inches	Center Dia. in Inches	Tenon Dia. in Inches
Up to and including 21	1⅛	⅞
Over 21, up to and including 26	1¼	⅞
Over 26, up to and including 32	1⅜	⅞

(2) Metal rungs of solid round stock shall have a minimum center diameter of ⅝" and tenon diameter of ½".

(3) Metal rungs of angle section shall have minimum dimensions of ¾x¾x⅛".

(4) "U" sections shall, in general, be considered as the equivalent of a "rung" and shall meet all the requirements of same.

(b) Treads.

(1) Wood treads shall have the following minimum dimensions:

Side Rail Length	
Up to and including 10 ft.	¾x3½ in.
Over 10 ft., up to and inc. 16 ft.	¾x4 in.
Over 16 ft., up to and including 20 ft.	⅞x4 in.

(c) Cleats.

(1) Wood cleats shall have the following minimum dimensions:

Cleat Length	
Up to and including 20 in.	⅞x3"
Over 20 in. up to and including 30 in.	⅞x4"

52. *Step Fastening.*

(a) Rungs shall be fastened securely at both ends.

(b) "U" sections on old construction may be fastened on the outside of the wall by using two (2) five-eighths (⅝) inch minimum diameter through bolts on each end.

(c) "U" sections of new construction shall be built into the structure a minimum of eight (8) inches with an upset inner end of a length not less than three (3) inches.

(d) Wood treads shall be inset in the side rails one-quarter (¼) inch, nailed or screwed, and further secured to the side rails with metal brackets, bolts, rods, or the equivalent.

(e) Metal treads shall be flanged downward not less than two (2) inches at each end of tread and secured by two (2) bolts or rivets to each side rail.

(f) Wood cleats shall be housed into rails one-half (½) inch and shall be nailed to each rail with two (2) tenpenny wire nails and bolted with one (1) carriage bolt one-quarter (¼) inch minimum diameter with washer under head and nut.

53. *Trolleys.*

(a) Tracks shall be iron, wood, steel or a combination of these materials.

Tracks for the top end of ladders shall be fastened securely to the ceiling or into framework and shall be so constructed that it is impossible for the wheels to jump the track, by having the wheels situated on opposite sides of a vertical flange, or by having the track so shaped that it completely encloses the sides of the wheels. Tracks shall be so designed as to provide for all possible strains to which they will be subjected.

Tracks for the bottom end of ladders shall be securely fastened and properly designed to provide for any strains to which they may be subjected.

(b) The wheel carriage shall be so designed as to provide for all strains to which it may be subjected.

The wheel carriage for the top end of the ladder shall be securely fastened to the top of the ladder with metal brackets bolted either to the side rails or to the top step. When bolted to

the top step this step shall be secured to the side rails with metal braces additional to those otherwise provided. This wheel carriage shall be so designed that the wheels attached to it will operate in pairs.

The wheel carriage for the bottom end of the ladder shall be securely fastened. Single wheels at the end of each side rail may be used with this carriage.

(c) The wheels at the upper end of the ladder shall have a minimum horizontal distance between the front and back wheels of 8" between centers. There shall be a minimum of four wheels making contact with the track.

The wheels at the bottom of the ladder shall consist of a minimum of two wheels, one under each side rail.

54. *Splice Plates.*

(a) Splice plates shall be of the same width as the material for side rails, and shall be placed on outside of side rails. Bolts or rivets shall be countersunk on the inside of the rail. All splice pieces shall be chamfered at the end and shall be made of metal.

(b) When metal rails are used the length of the splice plates shall be not less than four (4) times the width of the side rails, and not less than three (3) bolts or rivets shall be used each side of joint. Bolts or rivets shall not be less than one-half (½) inch or more than five-eighths (⅝) inch in diameter.

(c) Where side rails are of wood the length of the splice plates shall not be less than eight (8) times the width of the side rail and not less than four (4) bolts or rivets shall be used on each side of the joint.

SECTION 6. CONSTRUCTION

60. *Fixed Ladders.*

(a) Fixed ladders may have either parallel or spreading sides.

(b) Fixed ladders in other than vertical position shall have side rails increased in section to provide for possible increase in strain.

(c) Fixed ladders shall be firmly secured in position in accordance with rule 71.

61. *Portable Ladders.*

(a) Portable ladders over thirty (30) feet in length shall not be used.

(b) All portable ladders shall be built with spread side rails.

(c) Rectangular wood side rails may have an end depth of not less than two and one-quarter (2¼) inches, and shall have center cross section to conform to rule 50.

(d) Portable pole ladders shall be built with minimum dimensions of side rails as follows:

Side Rails Length in Feet	Side Rails — Bottom (in Inches)	Side Rails — Top (in Inches)
Up to 12	1½x2¾	1⅜x2¼
More than 12, up to 18	1⅝x3	1⅜x2¾
More than 18, up to 22	1¾x3¼	1½x2¾
More than 22, up to 30	1⅞x3⅝	1⅝x3

(e) Non-slip bases. All portable ladders shall be equipped with non-slip bases of a type approved for the conditions under which they are to be used.

(f) Hooked tops which will fit over shaftings, etc., shall be used on portable ladders where working conditions permit.

62. *Extension Ladders.*

(a) Side rails of extension ladders shall conform to dimensions under rule 50.

(b) The minimum distance between side rails of top section of extension ladders shall be as follows:

Length of Ladder in Feet	Between Rails Inches
Up to and inc. 26	12
Over 26, up to and inc. 34	14
Over 34, up to and inc. 40	15
Over 40, up to and inc. 60	17

(c) Bottom section of extension ladders may be made with spread side rails.

(d) Each ladder shall be equipped with two automatic locks of an approved type, (preferably of the spring type). Locks shall be of such construction as to make the extension ladder equal in strength to a ladder constructed of continuous side rails.

(e) All parts of the lock shall be of malleable iron or other approved material except spring and bushing, which shall be of non-corrosive material.

(f) Locking devices other than as specified herein may be used after being approved for such service.

(g) The ladder shall be equipped with a metal shackle and pulley.

63. *Fire Ladders.*

(a) Fire ladders shall be painted red and plainly marked "For fire purposes only."

(b) Fire ladders shall be built in accordance with rule 60 or rule 61, as installation requires.

64. *Step Ladders.*

(a) Step ladders over twenty (20) feet in length shall not be used.

(b) Step ladders shall have side rails of the following minimum cross section:

Length of Step Ladder in Feet	Front Section, in Inches
Up to and inc. 10	⅞x3
Over 10, up to and inc. 12	⅞x3¼
Over 12, up to and inc. 16	⅞x3½
Over 16, up to and inc. 20	1x3½

(c) Step ladders shall be so constructed that when in the open position the front section shall have a minimum slope of three and one-half (3½) inches, and the back section a minimum slope of two (2) inches, for each twelve (12) inch length of side rail.

Step ladders shall be so constructed that when in the open position the front section shall have level treads.

(d) The minimum width between side rails at top step, inside to inside, shall be not less than twelve (12) inches, with a spread of at least one (1) inch for each foot of length of step ladder.

(e) An automatic locking device or spreader to hold the front and back sections securely in open position shall be a component of each step ladder. This device shall have all sharp points covered to protect the user.

(f) The back section of the step ladder if provided with steps shall be built as per dimensions required by rule 50. If not provided with

steps the back section shall be built with side rails and bracing necessary to provide for all possible strains in this section.

65. *Trolley Ladders.*

(a) Ladders over twenty (20) feet in length should not be used.

(b) Side rails shall have a minimum cross section of the following dimensions:

	Inches
Up to 10 feet	⅞x3
Over 10 feet, up to and inc. 20 feet	⅞x3½

(c) Locking devices shall be provided on all trolley ladders to prevent them from moving under the weight of the operator.

66. *Sectional Ladders.*

(a) The number of sections shall not exceed eight (8).

(b) The connection joint shall be not less than one (1) foot. The grooved ends of the sections shall be reinforced with a metal plate of not less than No. 18 U. S. gauge properly secured thereto.

(c) Side rails shall have a minimum cross section and spread of the following dimensions.

Sections	Side Rails	
	Cross section Inches	Spread Inches
Up to and inc. four (4)	1⅛x2¼	13
Over four (4), up to and inc. (6)	1¼x3½	20
Over six (6), up to and inc. eight (8)	1⅛x3¼	24

(d) If the length of sections exceeds six feet four inches (6'4") the side rail cross section shall be increased to correspond.

67. *Trestle Ladders and Extension Trestle Ladders.*

(a) Trestle ladders over twenty (20) feet in length should not be used.

(b) Base ladders over twenty (20) feet in length shall not be used in connection with extension trestle ladders.

(c) Side rails of base ladders shall have a minimum cross section of the following dimensions.

	Inches
Up to and inc. 12 ft	1¼x2¼
Over 12 ft., up to and inc. 16 ft	1½x3
Over 16 ft., up to and inc. 20 ft	1½x3½

(d) The extension section shall be built to conform with the specifications for portable ladders, rule 61.

(e) Trestle ladders and base ladders shall be constructed with side rails spread as specified in rule 50 (c), and with a base spread when open as specified in rule 64 (c).

(f) Bearings shall be equivalent in strength, wear and construction to the specifications for steps, rule 51. Bearings shall not exceed sixteen (16) inches on centers. Top of side rails shall be cut on bevel, or other means shall be provided, to prevent them from spreading.

(g) A locking device or spreader, to hold the front and back base ladders securely in an open position shall be a component part of each ladder.

(h) The locking device for securing the extension section to the base shall be of an approved design.

SECTION 7. INSTALLATION

70. *Clearances.*

(a) Distances from front of rungs to nearest permanent object on the climbing side of the ladder shall be not less than thirty (30) inches.

There shall be a clear width of at least fifteen (15) inches from center on either side across the front of the ladder. (Ladders equipped with wells or cages or their equivalent shall be excepted.)

71. *Fastenings.*

(a) Fastenings shall be made of material equivalent in strength to the rails and shall be of sufficient length to allow a minimum distance of six and one-half (6½) inches between buildings and rungs of ladder. Fastenings shall be made to the permanent structure either by building in or by through bolts, rivets, or expansion bolts grouted or leaded.

(b) The maximum distance between fastenings or braces shall not be in excess of ten (10) feet in ladders over fifteen (15) feet in length, or other provision giving equivalent security shall be provided.

72. *Pitch.*

(a) The pitch of a fixed ladder shall not be such that a man's position is necessarily below the ladder when climbing.

(b) Portable ladders shall not be used with a pitch such that the horizontal distance from wall to foot of ladder shall exceed one-quarter (¼) length of ladder, unless it is securely fastened or a man is holding it.

73. *Maintenance.*

(a) All ladders should be serially numbered.

(b) A system of regular inspection should be maintained.

SECTION 8. ACCESSORIES

80. *Cages.*

(a) A basket or cage guard should be placed on permanent fixed ladders of twenty (20) feet or more in length.

(b) Cages, when used, shall extend from top of ladder to a point six feet six inches (6'6") above the base.

(c) Cages shall be substantially built and securely fastened to the ladder. The inside shall be clear of sharp projections.

(d) Cage shall be at least twenty (20) inches in diameter with the ladder acting as one side of cage.

81. *Landings.*

(a) All ladder landings shall be equipped with standard hand rails and toe guards so arranged as to give the safest possible access to the ladder. Such platforms shall be not less than twenty-four (24) inches in width.

82. *Landing Extension.*

(a) Ladders to landings should extend a distance of at least forty-five (45) inches above the landing preferably being goose-necked. The rungs may be omitted above a

roof. Where a man must step a greater distance than eighteen (18) inches from ladder to roof, tank, etc., a landing shall be provided. Top rung shall not be below roof or landing.

83. *Breaks.*

(a) If ladders are used to ascend to heights exceeding thirty (30) feet. landing platform shall be provided for each thirty (30) feet or fraction thereof.

90. *Safe Practices.*

(a) Ladders for use by individuals or under supervision shall be utilized as follows:

Crowding on ladders shall not be tolerated.

Portable ladders shall be placed in position with neither too small or too great an angle, and with a secure base or someone to hold it in place.

Ladders shall not be placed in front of doors opening toward the ladder.

Ladders should be provided with a board across the top before placing against window frames.

Ladders should be "faced" when ascending or descending, and both hands free for use.

Short ladders shall not be spliced together to provide long sections.

(b) Ladders with weakened or broken steps or side rails shall not be used.

(c) Ladders made by fastening cleats across a single rail shall not be used.

(d) Ladders for building construction more than two (2) stories in height, or where traffic is heavy, shall be separately designated for ascent and descent.

(e) Ladders which have developed defects shall be withdrawn from service for repair or destruction and tagged as "Dangerous—Do not use."

(f) Ladders should be stored in such a manner as to provide ease of access, inspection, and prevent danger of accident when withdrawing a ladder for use.

(g) Ladders should be kept painted with suitable preservative material.

ANNOUNCEMENT

MEMBERS may procure copies of the Safety Standard on Industrial Controllers by applying to the Secretary of the American Society of Safety Engineers, 29 West 39th street, New York, N. Y.

POSITION WANTED

Position wanted by a Safety Engineer who can reduce accidents and save you money; a position in an industry employing between 2,000 and 5,000 employes. Capable of editing a plant paper and is a good safety writer. Address A. S. S. E. No. 8, SAFETY ENGINEERING, 126 Maiden Lane, New York City.

REDUCING MINE ACCIDENTS IN SOUTH AFRICA

An Effective Safety-First Poster at the Recent Mining Exhibition in Johannesburg

From "Reef," Johannesburg

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 470 SPECIAL INSPECTIONS OF EQUIPMENT AS TO SAFETY.—The matter of periodical inspections of equipment, as hereinafter mentioned, is something which, both from the safe operating standpoint and from that of efficiency, must not be overlooked.

Inspections of this character will often bring to light defective conditions of equipment, where corrective measures may be applied in time to prevent accidents and breakage.

TRACKS

Warning signs, track connections, walks and railings at trestles, tell-tales, clearance of piled material, scrap along tracks, switches, etc., are all to be noted.

A weekly report covering condition of tracks should be rendered by the foreman of the track repair crew, or by another designated for the work.

LOCOMOTIVES

Head and tail lights, whistle, bell, foot and running boards, steps and grab irons, couplers and brakes, safety valves, sand equipment, wheels, tires, flanges, etc., must be examined.

The engine foreman or master mechanic may render the reports on this inspection.

ELEVATORS

Cables and connections, guides, cage, automatic stops, gates, emergency clutch, signaling apparatus, warning signs, counter weights and attachments, shafting, belts, pulley, drums, operating levers, shifters, valves, etc., must be scrutinized.

SHOP EQUIPMENT

This inspection will include sledges, chisels, punches, hammering tools, chains, ropes, blocks, chain falls, jacks, air and steam hoists, pinch- and crowbars, guards for shafting, gears, scaffolding, rope and tackle, etc.

CRANES

Drums, chains, wheels and flanges, brake and bell, bumpers, cable hooks, track clamps, lockout device, motors, electric wiring, generators, foot walks, railings, warning signs, etc., are points for examination.

RESULTS OF INSPECTION

It will soon be observed after the plant has started weekly inspections of equipment and the rendering of reports to the safety department, that they have a good effect in keeping the equipment in safe condition and in good working order. When repairs are necessary, the work may and should be followed up until completed.

Some of the larger factories employ men who devote their time to "special" inspection. Besides relieving the foremen of such work, this system has the further advantage of a disinterested report. A foreman is apt to report equipment in such a manner that no reflection will be cast on him, intending to remedy the condition without having reported it. Perhaps an accident or breakage occurs before repairs are made, although he has planned to make them.

ADVANTAGES OF SPECIAL INSPECTIONS

For instance, a foreman of the machine shop would hardly be expected to report that his men are using tools with mushroomed or burred heads, while they know that the tools should be dressed at regular intervals. A man appointed to take care of all the "special" inspections would more than earn his salary,—in fact his services would be a real asset to the employer,—for his inspections would be a check on the various foremen who have charge of such equipment as that mentioned above. Such "special" inspections tend to keep up spirit in the work, in that the foremen know that they are being checked up.

It is far better to know the condition of a cable drum as being fractured, and to take action for prompt replacement, than to have no knowledge of the condition until after an accident occurs, with the possibility of a fatality, together with a breakdown, which would be far more costly than the salary of a special inspector. Many unsafe conditions are revealed through special inspections, which otherwise may not come to light until it is too late.

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No. 471 FOREMEN'S RESPONSIBILITIES AT THE PRESENT MOMENT.—Prior to the latter part of last year, when a maximum number of men were employed and every effort was put forth to produce at top speed, if one undertook to speak about injuries to workmen, this alibi was almost invariably ready: "It is the new men that are being injured, and with the high rate of labor turnover there is no need to expect anything else." In many instances it would have been a waste of time to attempt to argue otherwise.

Since the beginning of 1921, few if any new men have been employed; in fact a great number of the older employes have been laid off. If the old theory that it was the new men who were injured had held good, then we should be free from accidents now. *But* instead of any such occurrence the injuries come, proportionally, in greater numbers than when the working force was at its height.

The theory has been advanced that with industrial conditions as they are,—intermittent employment and reduced working forces,—the workers' minds are not fixed on their work. They are rather trying to figure out how long the work will last, when the pick-up in business will come, how much stretching the dollar will stand.

If ever there was an inopportune time for the worker to be injured, right now is that time.

So it would appear that present conditions call for the highest kind of leadership on the part of all foremen. (The term "leadership" is here used in its widest sense.) During the rush and excitement of the past years, sometimes the personal touch between foremen and workmen has been greatly lessened or lost entirely. There have been times when the foreman has felt, sometimes justly, that he has not been treated right by some of the men. But a foreman ought to be a bigger man than to let some disagreeable incident of two or three years ago linger in his memory. He must feel that he is boss now, and put things through without much regard for any consideration other than production.

What is needed now more than anything else is manly, sympathetic, friendly leadership. Especially when the workman's mind is subject to worry about unemployment or part time work, the safe operation of a plant is peculiarly dependent on *right* industrial relations. We have to take to heart the old law that each is his brother's keeper. This obligates us to social kindness and economic as well as physical guardianship.

Prizes for June Articles

First Prize. No. 467. A. M. Underhill, Safety Engineer, S. F. Bowser & Company, Inc., Fort Wayne, Indiana.

Second Prize. No. 466. C. N. Woodruff, Detroit, Michigan.

Honorable Mention. No. 465. S. S. Gwillim, Superintendent, Trumbull Electric Manufacturing Company, Plainville, Connecticut.

Comments by Members of the Committee

I vote for Article No. 467. I know of several people who have been injured in practical jokes, the humor of which was never apparent to me. We have all been embarrassed at some time or other by these "jokers." Any measure taken to prevent horse play—at business or elsewhere—should receive the hearty cooperation of all.

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My vote goes to Article No. 466. I feel that here is a field that has not been worked over as much as it could be. The personal appeal, and especially through a friendly letter, is bound to bring results.

In my own work I have followed a course similar to the one outlined in the article, and I have learned to appreciate the value of this particular line of appeal. The letters should be friendly. Above all the semblance of a stereotyped form must be avoided.

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An esteemed member of the committee to award prizes for The Man On The Job articles, speaking of the value to him of serving in this way, writes: "I can say that SAFETY ENGINEERING has helped me not a little in my work as a safety engineer."

Remedial Education of the Blind

HANDICAPS of many kinds are the result of accidents. None of these deserves more serious effort to overcome than blindness, for none impairs the personal, social, and economic independence of the victim of the accident more completely, as long as he remains without special training.

Through persistent concentration on this handicap a system of education has been evolved that opens a wide field of activity and independence to handicapped persons. The New York Lighthouse for the Blind and seven other similar institutions in this country, France, and Italy furnish an education which proves that blindness need not end usefulness. With the training afforded the blind man or woman can be fitted to fill an important place in the seeing world.

At the "Lighthouses" the blind learn to read Braille raised type, and to work at trades by which they become wholly or partially self-supporting. The men make mops and brooms; the women make baskets, and weave, knit, sew and cook. The boys and girls learn stenography and telephony, and they study music, play games, act in dramatics, and dance, sing and swim. Both sexes have clubs which provide recreation, culture, and companionship. At the New York Lighthouse the summer school for children and the vacation for young folks and grown-ups at the River Lighthouse on the Hudson are two of the most enjoyable features of the year.

The Committee for Lighthouses for the Blind has been formed by Miss Winifred Holt, under the honorary chairmanship of President Harding, to obtain $2,000,000 for the upkeep and extension of this work. Secretary of the Treasury Andrew W. Mellon is honorary treasurer, and former Assistant Secretary of the Navy, Franklin D. Roosevelt, is chairman. Contributions may be sent to Lewis L. Clarke, Treasurer, 111 East 59th street, New York.

Threshing-Machine Explosions

AN investigation by the United States Department of Agriculture, reported in *The Travelers' Standard*, concerning the causes of fires and explosions in threshing-outfits during operation found that 75 per cent of these accidents are caused by the discharge of static electricity near clouds of smut and grain dust. In most cases, "the wheat that was being threshed contained from 1 to 35 per cent of kernels affected with smut, which is a fungus disease, exceedingly destructive to cereal plants. The affected wheat kernels are changed into a fine black powder, presumably consisting of the spores of the fungus, and in the course of the threshing process this powder is thrown into the air in the form of dust. During the operation of the separator, large quantities of static electricity are likely to be generated, especially on hot and dry days; and when the mixture of smut dust and air has reached the proper proportions, a static spark will readily explode the dust cloud. Other dust, which had settled on various parts of the interior of the machine, is thereby thrown into a state of suspension, and the new dust cloud thus formed is fired."

The fire may be caused by matches or hard foreign material in the grain when struck by the revolving cylinder-teeth, or by overheating from improper adjustment of the cylinder.

Preventive measures necessary include constant adjustment of all moving parts of the machine. Interior inspections during operation must dispense with naked lights, and use only such electric lamps as are encased in vapor-proof globes and protected by wire guards. The lubrication of bearings is important to avoid ignition of dust by overheated cylinder-shaft bearings. Special preventive methods are:

1. Removal of static electricity generated in the machine.
2. Removal of dust from the space back of the cylinder, and
3. Sprinkler systems.

Putting all moving parts in electrical connection with each other and with an external conductor grounded in moist earth is recommended by the Department of Agriculture inspectors. "A sharp-toothed and well-grounded collector comb, properly installed on the threshing machine, close to the belt and near the driving pulley, will remove the charge without causing sparking to occur. Similar devices should be used on all long belt drives. The revolving shafts on the machine, and especially the cylinder shaft, should be grounded by means of copper contact strips.

"Another series of devices for preventing dust explosions and fires embodies the principle of a dust-collecting fan, located on the top of the machine. The fan draws the dust from the interior of the thresher, and especially from the vicinity of the cylinder and beater,—thereby preventing the formation of explosive mixtures of smut or grain-dust and air. In addition, the grain is further cleaned by this process, and most of the incidental dust about the machine is also collected and discharged at one point. Some installations make use of more than one fan."

To fight such fires equipment based on three principles is used:

1. A chemical fire extinguisher,
2. A water supply under air pressure, or
3. A water supply under steam pressure from the boiler of the power plant.

In the last case, "the water is supplied through a steam hose connected with the boiler at a point below the water line. It is evident, however, that if any considerable quantity of water is blown off under these circumstances, the level of the water in the boiler may be dangerously lowered, and a boiler explosion may result. Moreover, there is danger that some of the workmen may be scalded by the hot water. Hence we cannot approve an arrangement of this kind."

An automatic extinguisher "arranged to spray a solution containing carbon dioxide gas through a series of nozzles located at critical points in the threshing machine" has been designed by the United States Office of Public Roads and Rural Engineering.

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

OIL WORKS AND TANKS

December 9, 1919. New Britain, Conn. Gasoline in wagon in yard, 551 Stanley street. Also a small shed. Cause, drawing gasoline by lantern light. No other details reported to SAFETY ENGINEERING.

December 20, 1919. Portland, Ore. Palm Olive Oil Company, 634 Roosevelt street. Copra oil refinery. One 2-story building destroyed. Walls, brick. Floors, wood. Roof, tar and gravel. Cause, sparks in attrition mill. Fire started on second floor. Discovered by employe about 2.05 p. m. Alarm, fire alarm box. Duration, several hours. Stopped at same building. Firemen handicapped by nature of contents. Private fire apparatus, none. Persons in building, about 15. Killed, none. Injured, 1. Means of escape, windows and doors. Value of building and contents, $410,000. Property loss, $315,000.

March 9, 1920. Roosevelt, N. J. Carteret Oil Refining Company, Railroad avenue. Oil shipping plant. One 1½-story building damaged. Walls, wood. Floors, wood. Roof, wood, rubberoid paper. Cause, overheated smokestack. Fire started in roof of boiler room. Discovered at about 10.30 a. m. Alarm, telephone and fire whistle. Duration, 6½ hours. Stopped at floor ruins, and on dock at water's edge. Fire was favored by oil in building and awaiting shipment on dock. Firemen handicapped by low water pressure. Private fire apparatus, none. Persons in building, about 20. Killed, none. Injured, none. Value of building and contents, about $150,000. Property loss not reported to SAFETY ENGINEERING.

March 23, 1920. Tulsa, Okla. The Constantina Refining Company, Division and Factory streets. Oil refinery. Three 1-story buildings destroyed. Walls, brick. Floors, concrete. Roofs, concrete. Cause, leaky hot tar line. Fire started at oil stills. Discovered by workmen at about 2.06 p. m. Alarm, box. Duration, about 24 hours. Stopped at river. Fire was favored by construction of buildings. Firemen handicapped by 35-mile gale. Private fire apparatus, none. Persons in building, unknown. Killed, none. Injured, 3. Value of building and contents, $500,000. Property loss, $480,000.

April 15, 1920. Snyder, Tex. Fuller Cotton Mill. Oil mill's hull house. One 1-story building destroyed. Walls, wood. Floors, none. Roof, composition. Cause, combustion. Fire started in center of hull. Discovered at about 8 or 9 o'clock. Alarm, telephone. Duration, 3 days. Stopped at building where it originated. Fire was favored by construction of building. Firemen handicapped by shortage of hose and difference in connections at mills. Private fire apparatus, elevator reservoir of about 80,000 gallons, and engine pump. Persons in building, 40 or 50. Killed, none. Injured, none. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

April 24. 1920. Dallas, Tex. Eastland Oil & Refining Company, West Dallas, outside city limits. Oil refinery. Cause, static electricity or lightning. Fire started in agitator tank. Discovered by employes at about 10 a. m. Alarm, telephone. Duration, about 1 hour. Stopped in tank. Private fire apparatus, fire-foam extinguishers. Killed, none. Injured, none. Means of escape, open prairie. Value of structure and contents and property loss unknown.

May 8, 1920. St. Paul, Minn. Manhattan Oil Company, 592 Vandalia street. Wholesale oils and grease. One 1-story building damaged. Walls, cement blocks. Floors, cement. Roof, pitch and gravel. Cause, explosion of gasoline, fumes from outside tank drifting into boiler room. Fire started in boiler room. Discovered by workmen at about 5.40 p. m. Alarm, telephone, followed by alarm box. Duration, about 4 hours. Stopped in same building. Fire was retarded by cement block walls. Private fire apparatus, fire extinguishers. Persons in building, 2, and 2 in tank outside. Killed, 1. Injured, 2. Means of escape, doors and windows. Value of building and contents, $185,000. Property loss, $4,592.

May 10, 1920. Crockett, Tex. Houston County Oil Mill & Manufacturing Company. One 2- and two 1-story buildings destroyed. Walls, iron. Floors, cement. Roofs, tin. Cause, unknown. Fire started in hull house. Discovered by night watchman at about 8.30 p. m. Alarm, regular. Duration, 3 hours. Stopped at third house. Fire was retarded by construction of buildings. Firemen handicapped by high wind. Private fire apparatus, 2½-inch

hose. Persons in building, unknown. Killed, none. Injured, none. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

May 24, 1920. Cushing, Okla. Inland Oil Refinery, Block 12, West Oak street. One 2-story building destroyed. Walls, galvanized iron. Floors, cement. Roof, galvanized iron. Cause, gasoline still explosion. Discovered immediately; big fire at about 11 a. m. Alarm, regular fire alarm. Duration, about 2 hours. Stopped at place where it originated. Private fire apparatus, chemical. Persons in building, 2. Killed, none. Injured, none. Means of escape, stairway. Value of building and contents, $20,000. Property loss, $20,000.

May 24, 1920. Houston, Tex. Fidelity Products Company, 3029 Washington avenue. Oil mill. One 1-story building damaged. Walls, wood. Floors, wood. Roof, tar paper and wood. Cause, unknown. Fire started in hull house. Discovered by watchman at about 12.50 a. m. Alarm, box and A. D. T. Burned about a week but under control in 1 hour. Stopped at same building. Fire was favored by wooden construction and hull content of building. Firemen handicapped by lack of water. Private fire apparatus, none. Persons in building, unknown. Killed, none. Injured, none. Means of escape, doors and windows. Value of building and contents, $115,845. Property loss, $91,272.

May 28, 1920. San Mateo, Calif. Peninsula Burner & Oil Company, outside city limits, isolated. Workshop and store-room. One 1-story building damaged. Walls, frame. Floors, frame. Roof, shingle. Cause, burning of grass around tanks. Fire started about 50 feet from tanks. Alarm, telephone. Duration, several hours. Two 15,000-gallon tanks of oil, sealed, with small expansion-vents, did not explode. Firemen handicapped by fire being out of range of fire department. Private fire apparatus, none. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

August 3, 1920. Pharr, Tex. Humble Oil & Refining Company. Oil plant and office building. One 1-story building, 1 storage tank and 1 tank car damaged. Walls, corrugated iron. Floors, board. Roof, corrugated iron. Cause, unknown. Fire started in filling room. Discovered by employe's loading oil on truck at about 2 p. m. Alarm, fire whistle. Duration, about 8 hours. Stopped on company's property. Fire was retarded by construction, but favored by oil tanks and containers. Firemen handicapped by danger of oil tanks' blowing up. Empty oil barrels exploded in all directions. Private fire apparatus, none. Persons in building 3. Killed, none. Injured, none. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

August 15, 1920. Philadelphia, Pa. Gulf Refining Company, Passyank avenue bridge. Oil tank damaged. Walls, iron. Cause, lightning. Discovered at 7.49 p. m. Alarm, telephone. Duration, 8 hours. Stopped at tank. Further details not reported to SAFETY ENGINEERING.

August 23, 1920. Toledo, O. Toledo Seed & Oil Company, Industrial and Hanson streets. Castor oil works. One 2-story percolator building damaged. Walls, concrete block. Floors, wood. Roof, wood. Cause, explosion of benzol. Fire started in percolator inside of building. Discovered by citizen at about 9.34 p. m. Alarm, street box. Duration, about 12 hours. Stopped at same building. Private fire apparatus, none. Persons in building, 2 (night engineer and watchman). Killed, 1 (night engineer). Injured, 2 (firemen). Value of building and contents, $100,000. Property loss, $41,321.

October 14, 1920. Des Moines, Ia. Manhattan Oil Company of Iowa, facing Murray street, between S. W. 9th and S. W. 11th streets. Oil storage station, warehouse and tanks. One frame shed destroyed and one 2-story brick building damaged; several tanks ruptured and pipe connections broken. Cause, explosion in yard, possibly caused by lightning, or possibly by mixture of gas and air from automobile gasoline tank removed near boiler room door. Time of explosion, 3.14 p. m. Alarm, A. D. T. box on premises, immediately. Duration, under control in 6 hours. Fire broke out again, probably from latent heat, on next morning, and burned 1 hour. Stopped at plant of origin. Spread of fire was favored by poor house-keeping, wooden supports under tanks, extreme congestion, and excessive accumulation of small empty containers. The fact that an oil plant fire can be controlled when the storage is in properly constructed and separated steel tanks, by powerful streams of water of large size, was well illustrated in this fire. Firemen were somewhat handicapped by the extremely wide spacing of hydrants, and their lack of large connections for engines. Private fire apparatus, one 40-gal. foamite extinguisher on wheels, 7 J-M carbon-tetrachloride hand extinguishers. Persons in building, not reported. Value of building and contents and property loss not stated: gasoline lost, 57,460 gal., lubricating oil, 66,750 gal., and kerosene, 39,080 gal

October 30, 1920. Red Springs, N. C. Morgan Oil & Fertilizer Company. Oil mill and gins. One 1-story mill building damaged. Walls, brick. Floors, wood. Roof, composition. Cause, friction. Fire started in linter room. Discovered by operators at about 9.45. Alarm, whistle and telephone. Duration, 4 hours. Stopped at fire walls at end of mill. Fire was retarded by fire walls. Private fire apparatus, none. Persons in building, 6. Killed, none. Injured, none. Means of escape, doors. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

November 14, 1920. San Antonio, Tex. Grayburg Oil Company, Roosevelt avenue and Mitchell street. Oil refinery. One 1-story building damaged. Walls, brick and concrete. Floors, earth. Roof, metal. Cause, ignition of waste oil. Fire started in oil still. Discovered by employe at about 3.54 a. m. Alarm, A. D. T. Duration, 1½ hours. Stopped at still. Fire was favored by construction of building. Private fire apparatus, chemical engine on

wheels. Persons in building, none. Value of building and contents, $6,500. Property loss, $6,500. Papers were protected.

November 27, 1920. Houston, Tex. Bonner Oil Company, 2502 Conti street. Warehouse. One 1-story building damaged. Walls, wood. Floors, wood. Roofs, iron-clad. Cause, probably sparks from locomotive. Discovered by employe at about 3.05 p. m. Alarm, telephone. Duration, 3 hours. Stopped at same building. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, unknown. Killed, none. Injured, none. Means of escape, doors and windows. Value of building and contents, $89,500. Property loss, $79,125.

December 2, 1920. Indiana, Pa. American Gasoline & Oil Company, corner of Water and 11th streets. Store, gasoline storage tank and dwelling. One 1-story building destroyed and dwelling damaged. Walls, wood. Floors, wood. Roof, iron. Cause, explosion of large storage tank of gasoline outside. Fire started in warehouse. Discovered by employe working in building at about 7.15 a. m. Alarm, telephone to alarm station. Duration, 8 hours. Stopped at dwelling. Fire was favored by wooden construction. Private fire apparatus, none. Persons in building, 2. Killed, none. Injured, none. Means of escape, window and door. Value of store and tank, $30,000. Property loss, $30,000. Papers partly lost.

December 23, 1920. Galveston, Tex. Oil barge "Bolikow," and Southern Pacific wharves, Pier "A." One wooden barge destroyed and wharf and elevator conveyor damaged. Cause, spontaneous combustion. Fire started with explosion in crude oil in barge. Discovered at about 1.50 p. m. Alarm, box. Duration, 19 hours. Stopped on wharf. Fire was favored by wooden construction. Private fire apparatus, none. Persons in building, 10. Killed, 4. Injured, 6. Value of building and contents, $1,565,000. Property loss, $610,000 ($290,000 on barge and contents; $320,000 on adjoining wharf property).

January 15, 1921. Philadelphia, Pa. Corn Planters' Refining Company, S. W. corner Newmarket and Germantown avenues. Oil warehouse. One 5- and 3-story building damaged. Walls, brick. Floors, wood. Roofs, tin. Fire started on first floor. Discovered at 10.51 p. m. Alarm, telegraph. Duration, 4 hours, 40 minutes. Stopped at roof. Means of escape, outside escape.

February 6, 1921. Huntsville, Ala. Warehouse and oil mill of F. & O. Cedar Works, North Mill street. Pencil mill. One building partly destroyed. Walls, galvanized. Cause, unknown. Discovered by night watchman. Alarm, telephone. Duration, 12 hours. Stopped in center of building at fire-ladder. Fire was retarded by fireproof construction of building. Private fire apparatus, none. Persons in building, none. Value of building and contents, about $23,000. Property loss, $23,000. Papers were all lost.

February 17, 1921. Philadelphia, Pa. Atlantic Refining Company, Point Boerge. Refining plant. Cause, overheating. Fire started in stills. Alarm, telegraph. Duration, 5 hours. Stopped at stills.

March 4, 1921. Savannah, Ga. Atlantic Turpentine & Pine Tar Company, Louisville road, 2 miles beyond limits. Pine tar and oil plant. Four 1-story buildings damaged. Walls, wood. Floors, wood. Roofs, wood, metal covered. Cause, unknown. Discovered by employes at 11.25 a. m. Alarm, telephone. Duration, 4 hours. Fire was favored by construction of building. Firemen handicapped by having to cross railroad tracks almost impossible to negotiate. Plant closed, office force only on duty. Killed, none. Injured, none. Means of escape, open all around. Value of building and contents, $126,213. Property loss, $26,000.

BREWERIES AND MALT HOUSES

January 19, 1920. Rochester, N. Y. American Brewery Company's main building, Hudson avenue and Merrimac street. One 7-story building damaged. Walls, brick. Floors, fireproof below fifth floor. Roof, frame. Cause, thawing water pipes. Fire started on sixth floor. Discovered by citizen at about 12.46 p. m. Alarm, Gamewell system. Duration, 1½ hours. Stopped at sixth and seventh floors. Fire was favored by inflammable construction above fifth floor. Private fire apparatus, none. Persons in building, unknown. Killed, none. Injured, none. Value of building and contents not reported. Property loss estimated $50,000.

May 11, 1920. Duluth, Minn. Duluth Brewing Company, 231 South 29th avenue, West. One 2-story-and-basement building damaged, second floor consisting of gallery around walls. Walls, brick. Floors, concrete with steel supports. Roof, flat, tarred and graveled. Cause unable to ascertain, probably men smoking. Fire started in packing stored in basement. Discovered by smoke coming through stair openings at about 12.14 p. m. Alarm, telegraph alarm box. Duration, about 4½ hours. Stopped at basement. Damage confined to interior. Fire was retarded by fireproof construction; the only way that fire could get to main floor was through stair openings. Firemen handicapped by heavy smoke. Private fire apparatus, standpipes with 2½-inch hose. Persons in building, usually 25; as fire occurred at noon hour most of them were away. Killed, none. Injured, none. Means of escape, large doors on main floor. Value of building and contents, $45,000. Property loss, $16,500.

September 2, 1920. Brooklyn, N. Y. Brewery, Myrtle and Wyckoff avenues. One 5-story building damaged. Walls, brick. Cause, not ascertained. Fire started in bags of malt on second floor. Discovered by citizen at about 5.50 p. m. Alarm, telegraph. Duration, 45 minutes. Extended from third to fifth floors before arrival of fire department. Fire was favored by open stairways and shaft. Firemen handicapped by delay in transmitting alarm to department. Private fire apparatus, none

Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

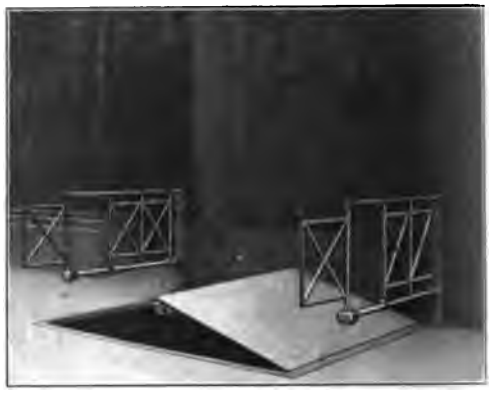
A NEW SAFETY DEVICE FOR SIDEWALK FREIGHT ELEVATORS

It is unpleasant, to say the least, to be walking over the top of a sidewalk freight lift and have the covers suddenly rise and throw you off. It is, in fact, more than unpleasant—extremely dangerous. Many accidents have resulted from such a situation, some of them of a very serious nature. One case, recently brought to our attention, cost the owner of a New York building $25,000 in settlement of damages.

There has seemed in the past to be no remedy for this perilous condition. The old-fashioned pipe guards, with chains across the front, constitute serious obstructions to the highway, and the city authorities have, in many cities, been compelled to order them removed. In New York they are not allowed.

A bell, ringing as the lift ascends, has proven undependable. Even when it rings, people pay little attention to it. Nothing is left save for the owner to station a man permanently on the sidewalk, or to send him up ahead of each trip, to warn people off. This, in these times of high wages, is expensive, and, even so, does not entirely relieve the situation of danger. The man, supposedly on the job continually, might conceivably go off for a while, or take a nap between whiles. As to those supposed to come up at each trip,—well, you know how it is. That tired feeling.

At this stage the Shur-Lock Elevator Safety



Company of New York has stepped into the gap, with an invention which seems to solve the problem completely. Swung on upright stanchions attached to the building, they have two gates substantially built up of steel bars. When the lift is down and the covers closed, these gates lie flat against the building, but as the lift begins to rise, they automatically and very slowly swing outward. To one crossing the covers they virtually say: "The lift is going to come up in a minute. You had better get off those covers. Move, please!" After the gates have opened and stand at right angles to the building line, the covers begin to rise. In reverse order, after the lift has descended and the covers closed, the gates close and again lie flat against the building, leaving nothing to obstruct the sidewalk.

We recently examined one of these devices, installed at the Berkeley Arcade, 19 West 44th Street, New York. Its operation was most interesting to see. One feature, almost uncanny in its approach to human control, was the effect of resistance to the opening of the gates. The writer, as the gates started to open, pushed against them with moderate force. They desisted from their outward movement, and it was discovered that the elevator had stopped. When the pressure was removed and the lift again started up, they resumed their protective travel to full opening. It was demonstrated that by simple adjustment the pressure necessary to stop the lift could be set at

any amount desired—five pounds, ten pounds, etc.

This proved to be a feature of importance, as if the outward movement of the gates were irresistible, they might conceivably injure some one unable, for some reason, to get off the covers. Being set, however, at twenty pounds pressure, the weight of even a child's body would cause the elevator, and thus the gates, to stop. So, also, if a heavy packing box were resting on the covers and the movement of the gates were irresistible, they would naturally be wrecked. With the pressure-stop, the resistance of the box weight would simply prevent the gates from opening, and this in turn would stop the lift.

The equipment is surprisingly simple in design, very substantially made, and apparently will last as long as the lift itself. The equipment at the Berkeley Building is attractive in appearance and the makers inform us that they are prepared to furnish gates adapted to the architectural style and finish of any building in connection with which they are to be used. The equipment has received the heartiest endorsement of the Building Department of the City of New York, and of the leading Casualty Insurance Companies.

DURATION TIME STUDY WATCH

To meet the ever-increasing demands of the industries for time and motion study equipment, the Mortimer J. Silberberg Co., 122 S. Michigan Avenue, Chicago, have just perfected a new instrument termed the Duration Time Study Watch, designed to handle the timing, analysis and observation of from one to ten operations, up to and including five minutes of duration.

The instrument illustrated has three circles on the face of the dial, the outer circle being in red, the center circle in black and the inner circle in blue. The large hand makes a total revolution of 100 seconds, and the small hand in the center moves over a red, black and blue sector, thereby showing in which circle the large hand is operating.

All of the figures on the face of the dial denote production per hour, based on the timing of 10 operations. As an instance: If 10 operations were observed to have elapsed in 20 seconds the figure under the large hand in the red circle would show 1,800 operations per hour, based on 10 operations having been completed in 20 seconds. If instead of 10 operations, one operation is observed to have lasted 20 seconds, then instead of 1,800 it would be necessary to point off one figure with a decimal, and the result would be 180 operations per hour, based on one operation being completed in 20 seconds.

If an operation is timed and its duration is 130 seconds it will be noted that the large hand will have made one total revolution, and thirty seconds additional, and the small hand in the center of the dial will have passed the first sector, and show in the second sector, which is the black, and which denotes that the operation must be read in the black circle; and reading under the 30-second mark in the black circle the figure 277 will be noted. However, this figure being based on the observation of 10 operations, and only one operation having been timed in that period, it is necessary to point off one figure, and the result is then 27.7 operations per hour, based on one operation timed in 130 seconds. The same applies to operations of longer periods; the small hand moves in the colored sector, showing in which circle the large hand is operating, and makes it easy to calculate the elapsed time.

The instrument has the take-out time feature, which allows the operator to start and stop the watch without returning the large hand to "zero," and when an operation is entirely completed pressing the crown down returns all hands to the starting point. The dial is divided in seconds and half-seconds.

The instrument is of a very sturdy type, designed for industrial purposes, and with the present endeavors to analyze and cut costs it should prove a valuable adjunct in every plant.

"ANGLMESH" GUARDS

Bearing on the cover an exact representation in gold and black of their label, the new catalog of the Orr Machine Guarding Company of Trenton, N. J., presents a most attractive appearance and contains much of interest to safety engineers. The company's policy is fully outlined including their manner of making contracts which are very inclusive in their items of service.

The illustrations show the manner in which machines of various kinds are protected and the various kinds of material used are illustrated and described. Letters from the departments of labor of several States prove that these guards are erected in strict conformity with legal requirements and letters from customers certify to the satisfaction given. There is an unusually interesting collection of pictures for they show guards of extraordinary type and on the whole the book is well worth sending for.

FOR SAFETY IN TRANSFERRING DANGEROUS ACIDS

A pneumatic acid syphon has been placed on the market by the Pyrene Manufacturing Company, manufacturer of the Pyrene Fire Extinguisher, and is meeting with considerable favor from fire departments, battery service stations, dairies, chemical laboratories, and other users of sulphuric acid.

The syphon is used in transferring acid from the carboy to small bottles, pitchers, etc. An air pump is used—similar to an automobile tire pump—and the air pressure causes the acid to flow out through a tube. There is an automatic valve in the head of the syphon which acts as a safety. This valve can also be operated manually when the operator desires to stop the flow of acid.

The slopping or spilling of sulphuric acid usually results in ruined shoes, ruined clothing or burned flesh,—and it is practically impossible to avoid slopping and spilling when acid is poured out of carboys in the old-fashioned way, or even when a carboy inclinator is used.

It is surprising to find how many industries use sulphuric acid. There is a carboy in practically every fire house, for use in the chemical tanks and hand extinguishers. Battery service stations use sulphuric acid when charging batteries. Dairies use it in making the Babcock test for butter fat. Wholesale druggists, school laboratories, and many manufacturers handle sulphuric acid in carboys, and must provide some safe means for transferring it to smaller containers. Therefore, the syphon should find a ready market from a wide and varied field.

FERALUN

We have just received an interesting collection of data from the American Abrasive Metals Company, 50 Church Street, New York, showing applications of anti-slip treads and illustrations of prominent buildings in which the product of this company has been installed. This is accompanied by statistics on frequency of falls and is on the whole very instructive.

WESTINGHOUSE-VENTURA FANS

Efficiency of industrial workers can be obtained only when the employes are satisfied. Cooling the shop and removing foul air with Westinghouse-Ventura Fans will help to make the workers satisfied and to keep them healthy and enthusiastic.

These Fans can be mounted on the wall and will occupy almost no room space. They are extensively used in factories, foundries, laboratories, hotel kitchens and almost every place where efficiency depends upon the comfort of the employes.

A Westinghouse-Ventura Fan consists of four main parts: A fan wheel, a ring, three arms and a motor. The fan wheel is mounted on the motor shaft; the motor being supported by three arms which are attached to the ring.

The fan wheel consists of ten steel blades securely riveted to a large central disc. It is light in weight and perfectly balanced to prevent vibration.

The ring is cast iron and drilled for wall mounting.

The arms are firmly bolted to the ring and to the motor rigid support.

The motor is of special design; entirely enclosed to protect it from dirt, dust and moisture.

They are so sturdily constructed and perfectly balanced that they will run for seasons without attention.

These Fans are described in a folder known as No. 4455 which can be secured from any of the offices of the Westinghouse Electric & Manufacturing Company whose headquarters are at Pittsburgh.

BOLOGH SKYLIGHT VENTILATORS

A very interesting combination of skylight and ventilator has been developed by the Bologh Skylight & Gravity Ventilator Company, 200 Fifth Avenue, New York. It is a new and entirely practical device and is a skylight plus a ventilator, gravity operated and made of structural steel, sheet metal and glass.

Whether open or closed, the BOLOGH Skylight and Gravity Ventilator is absolutely stormproof

The construction is such that it can be used as a lean-to ventilator and skylight or placed in any position desired.

The Bologh eliminates the use of turrets and monitor sides.

One person can easily operate it. By releasing the holding chain or rope, the entire glazed surface opens by gravity and any degree of opening can be obtained at the will of the operator, up to full opening.

The Bologh skylight ventilator is adapted to industrial buildings, offices, theaters, schools and in all places where combined roof lighting and ventilation is required.

The feature of special interest is the large free air opening and 100% effective ventilation that is afforded—the entire top of the skylight (glazed surface) opens and allows an amount of ventilation equal to the skylight well opening.

The Bologh skylight ventilator is self-opening when the control is released, whether operated by hand, or effected as the result of fire by melting a fusible link in a chain control or burning the ropes when ropes are used to control the ventilator. These chains or ropes may drop from the ventilator to the floor and be operated at that point. This arrangement makes it certain that in the event of fire, the smoke will rise and the heat will either burn off the ropes or melt the fusible link in the chain so that the skylight will automatically open and the full area of the opening at the base will be effective, as the sash openings in the two sides of the peak roof skylight has a much larger area than the base opening.

It has been tested and approved by the New York Building Department, New York Fire Department and the Fire Exchange. It is being generally accepted as the one and only really practical solution of an always troublesome problem.

Showing how the skylight top opening equals the well opening

UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

ACETYLENE GENERATOR—Pennsylvania Sales Co., Submittor, Tunkhannock, Pa.

ACETYLENE GENERATOR—St. Clair Mfg. Co., The. Submittor, Dayton, O.

ARMORED CABLE—Bourn Rubber Co., Mfr., 58 Waldo St., Providence, R. I.

ARMORED CABLE—Triangle Conduit Co., Inc., Mfr., 50-54 Columbia Heights, Brooklyn, N. Y.

AUTOMATIC SWITCHES—PRESSURE OPERATED TYPE—Roper Corp., Geo. D., Mfr., Rockford, Ill.

BELLS—Edwards & Co., Mfr., 140th & Exterior Sts., New York, N. Y.

CABINETS AND CUTOUT BOXES—SHEET METAL—Large-Dail Mfg. Co., Mfr., 114 N. 13th St., Philadelphia, Pa.

CABINETS AND CUTOUT BOXES—SHEET METAL—Service Elec. Mfg. Co., 526 S. Fifth St., Minneapolis, Minn.

CARTRIDGE ENCLOSED FUSES — RENEWABLE—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

CARTRIDGE FUSE CUTOUT BASES—Multi-Electrical Mfg. Co., Mfr., 703 Fulton St., Chicago, Ill.

CARTRIDGE FUSES — RENEWABLE — Multiple Elec. Products Co., Inc., Submittor, 61 Broadway, New York, N. Y., Greeff Engineering & Mfg. Co., Mfr., 36-38 Spring St., Newark, N. J.

CLASS A BUILT-UP GRAVEL OR SLAG SURFACED ROOF COVERINGS—Ruberoid Co., The, Mfr., 95 Madison Ave., New York, N. Y.

CLASS A SHINGLE ROOF COVERINGS—Asbestos Shingle, Slate & Sheathing Co., Mfr., Ambler, Pa.

CLASS B SAFES—Yawman & Erbe Mfg. Co., Mfr., Rochester, N. Y.

CLASS B SHINGLE ROOF COVERINGS—Asbestos Shingle, Slate & Sheathing Co., Mfr., Ambler, Pa.

CLASS C PREPARED ROOF COVERINGS—Lowell Roofing Mfg. Co., Mfr., Lowell, Ind.

CLASS C PREPARED ROOF COVERINGS—Ruberoid Co., The, Ltd., Mfr., Victoria Bldg., Montreal, Can.

CLASS C SHINGLE ROOF COVERINGS—Lowell Roofing Mfg. Co., Mfr., Lowell, Ind.

CLASS C SHINGLE ROOF COVERINGS—Ruberoid Co., The, Mfr., Victoria Bldg., Montreal, Can.

CLASS C SHINGLE ROOF COVERINGS—Stowell Mfg. Co., Mfr., 244-64 Culver Ave., Jer ey City, N. J.

CONDUIT BOXES—Electrical Fitting & Foundry Ltd., Mfr., 331 King St., West, Toronto, Ontario.

COUNTERBALANCED STEEL ELEVATOR DOOR—Variety Fire Door Co., Mfr., Carroll & Sacramento Aves., Chicago, Ill.

ENCLOSED SWITCHES—Aurora Steel Products Co., Mfr., Aurora, Ill.

ENCLOSED SWITCHES—Garvin & Co., Sam, Mfr., 5124 W. Lake St., Chicago, Ill.

ENCLOSED SWITCHES — Metropolitan Device Corp., Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

ENCLOSED SWITCH—Safety Electric Co., Mfr., 59 Columbia St., San Francisco, Calif.

ENCLOSED SWITCH—Square D Co., Mfr., Detroit, Mich.

EXPANDED METAL FOR GUARDS—Northwestern Expanded Metal Co., Mfr., 407 S. Dearborn St., Chicago, Ill.

EXTINGUISHER, 5 GAL. PUMP TYPE—Childs Co., Inc., O. J. Submittor, 50 Liberty St., Utica, N. Y.

FITTINGS FOR CONDUIT BOXES—Vandy, B. A., Mfr., 223 Andrews St., Rochester, N. Y.

FIXTURES—Miller & Co., Edward, Mfr., Meriden, Conn.

FIXTURE SWITCHES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

FIXTURE SWITCHES—Weber Electric Co., Mfr., Schenectady, N. Y.

FLEXIBLE TUBING—Eastern Tube & Tool Co., Inc., Mfr., 41 Gardner Ave., Brooklyn, N. Y.

FRAMES—DOUBLE TYPE—Ruda Co., L. A., Mfr., 2306 S. Kedzie Ave., Chicago, Ill.

FRAMES—DOUBLE TYPE—Variety Fire Door Co., Mfr., Carroll & Sacramento Aves., Chicago, Ill.

FUSED ROSETTES—LINK TYPE—Weber Electric Co., Mfr., Schenectady, N. Y.

FUSELESS ATTACHMENT PLUGS — Bryant Electric Co., The., Mfr., Bridgeport, Conn.

FUSELESS ATTACHMENT PLUGS—Hubbell, Inc., Harvey, Mfr., Bridgeport, Conn.

FUSELESS ROSETTES—Weber Electric Co., Mfr., Schenectady, N. Y.

GOGGLES—Strauss & Buegeleisen, Mfr., 16 Hanover Pl., Brooklyn, N. Y.

GROUND CLAMPS—Hutton Elec. Mfg. Co., Mfr., 2730 W. Alleghany Ave., Philadelphia, Pa.

HARDWARE—LOCKS—Variety Fire Door Co., Mfr., Carroll & Sacramento Aves., Chicago, Ill.

HARDWARE—SLIDING PATTERN — Variety Fire Door Co., Mfr., Carroll & Sacramento Aves. Chicago, Ill.

HOLD-OPEN AND AUTOMATIC FIRE RELEASE ATTACHMENT FOR SWINGING DOOR CLOSERS—Norton Door Closer Co., Mfr., 2900 N. Western Ave., Chicago, Ill.

HOLLOW METAL FIRE WINDOW FRAME—Wagner's Sons Co., J. F., Mfr., 1145-49 7th St., Louisville, Ky.

HORNS—Klaxon Co., Mfr., Newark, N. J.

INSIDE HAND-OPERATED DISCHARGE DEVICE—Boyle-Dayton Co., The, Mfr., 51st and Santa Fe Ave., Los Angeles, Calif.

INSIDE HAND-OPERATED DISCHARGE DEVICE—St. Louis Pump & Equipment Co., Mfr., 6403 Maple Ave., St. Louis, Mo.

KNIFE SWITCHES—King-Craymer Electric Mfg. Co., Mfr., 32 Haviland St., South Norwalk, Conn.

KNIFE SWITCHES—Kirkman Engineering Corp., Mfr., 484-90 Broome St., New York, N. Y.

LIGHTNING RODS—Allentown Cable & Machine Co., Mfr., Allentown, Pa.

LIGHTNING RODS—Hawkeye Lightning Rod Co., The, Mfr., Cedar Rapids, Ia.

MEDIUM BASE RECEPTACLES — Benjamin Electric Mfg. Co., 120 S. Sangamon St., Chicago, Ill.

MEDIUM BASE RECEPTACLES—Mesa, Fernando Co., Mfr., Irvington, N. J.

MEDIUM BASE RECEPTACLES—Weber Electric Co., Mfr., Schenectady, N. Y.

OUTLET BUSHINGS AND FITTINGS—BOX CONNECTORS—Chatham Die Castings Co., Inc., Mfr., 128 Mott St., New York, N. Y.

PANELBOARDS—Service Electric Mfg. Co., Mfr., 526 S. 5th St., Minneapolis, Minn.

PANELBOARDS—Stewart Electrical Mfg. Co., Mfr., 60 Natoma St., San Francisco, Calif.

PANELBOARDS—Westinghouse Electric & Mfg. Co., Mfr., Chicago Service Station, 32 S. Peoria St., Chicago, Ill.

PENDENT SWITCHES—Beaver Machine & Tool Co., Inc., Mfr., 625 North Third St., Newark, N. J.

PENDENT SWITCHES—Weber Electric Co., Mfr., Schenectady, N. Y.

PLUG FUSES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

PLUG FUSES—Protex Fuse Works, Mfr., 1623 E. 43rd St., Cleveland, O.

PUSH AND ROTARY FLUSH SWITCHES—Hart & Hegeman Mfg. Co., The, Mfr., 342 Capitol Ave., Hartford, Conn.

PUSH FLUSH SWITCHES—Standard Electric Mfg. Co., The, Mfr., 925 Wrightwood Ave., Chicago, Ill.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

RECTIFIERS—Westinghouse Electric & Mfg. Co., Mfr., East Pittsburgh, Pa.

ROLLING STEEL ELEVATOR DOORS—Variety Fire Door Co., Mfr., Carroll and Sacramento Aves., Chicago, Ill.

SIGNS—Electric Advertising Sales Agency, Mfr., 807 Poydras St., New Orleans, La.

SLIDING AND SWINGING SHEET METAL FIRE WALL DOOR—Variety Fire Door Co., Mfr., Carroll and Sacramento Aves., Chicago, Ill.

SLIDING AND SWINGING, TIN-CLAD, FIRE WALL DOOR—Commins-Moffatt, Ltd., Mfr., 86 Don Esplanada, Toronto, Ontario, Can.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Eisenhour, C. W., Mfr., Logan & Boyd Sts., Harrisburg, Pa.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Knoburn Products Corp., Mfr., Hoboken, N. J.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Standard Kalamein Door Co., Mfr., 222-24 Eagle St., Brooklyn, N. Y.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Variety Fire Door Co., Mfr., Carroll & Sacramento Aves., Chicago, Ill.

SURFACE SWITCHES—Bryant Electric Co., Mfr., Bridgeport, Conn.

SURFACE SWITCHES—General Electric Co., Mfr. Schenectady, N. Y.

SURFACE SWITCHES—Hart Mfg. Co., The, Mfr., Hartford, Conn.

SURFACE SWITCHES—Standard Electric Mfg. Co., The, Mfr., 925 Wrightwood Ave., Chicago, Ill.

SWINGING HOLLOW METAL, VERTICAL COMMUNICATION DOOR—Ruda Co., L. A., Mfr., 2306 S. Kedzie Ave., Chicago, Ill.

SWINGING, HOLLOW-METAL, VERTICAL COMMUNICATION DOOR—Variety Fire Door Co., Mfr., Carroll & Sacramento Aves., Chicago, Ill.

SWINGING, METAL-CLAD, VERTICAL COMMUNICATION DOOR—Knoburn Products Corp., Mfr., Hoboken, N. J.

SWINGING, METAL-CLAD, VERTICAL COMMUNICATION DOOR—Variety Fire Door Co., Mfr., Carroll and Sacramento Aves., Chicago, Ill.

Safety Engineering

Vol. 42 SEPTEMBER, 1921 No. 3

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Tenth Annual Safety Congress of the National Safety Council

Boston, Mass., September 26, 27, 28, 29 and 30

FIRST DAY

Monday, September 26, 10 a. m.

Auditorium, First Floor

ANNUAL MEETING OF MEMBERS. Chairman, C. P. Tolman, President, National Safety Council.

Invocation.

Address of Welcome by Hon. Channing H. Cox, Governor of Massachusetts.

Response by President.

Address by Howard Coonley, President of the Massachusetts Safety Council.

Roll Call or other ascertainment of members present.

President's Address.

Reading and disposal of unapproved minutes.

Reports of Officers and Committees:

- General Manager.
- Committee on Service to Members.
- Committee on Standardization and Technical Development.
- Committee on Business and Administration.
- Committee on Local Councils.
- Committee on Publicity.
- Resolutions Committee.
- Nominating Committee.

Election of Directors.

Unfinished Business.

New Business.

Monday, September 26, 2 p. m.

Auditorium, First Floor

GENERAL SESSION: PUBLIC SAFETY AND EDUCATION. Chairman, Hon. Andrew J. Peters, Mayor of Boston.

Public Safety.—Arthur Woods, Former Police Commissioner of New York.

Safety Instruction in Public and Parochial Schools.—Dr. John W. Withers, Dean, School of Education, University of New York.

Report of Secretary of Education Section.—C. W. Price, General Manager, National Safety Council.

Monday, September 26, 4:30 p. m.

Auditorium, First Floor

FIRST AID DEMONSTRATIONS.—Demonstrations by a first aid team from the Bell Telephone Company of Pennsylvania, Philadelphia, immediately following the close of the general session on Public Safety and Education. Two reels of motion pictures showing first aid contests will also be shown.

Monday, September 26, 8 p. m.

RECEPTION AND DANCE.—Mayor Andrew J. Peters, Chairman of the Reception Committee, cordially invites all delegates and visitors at the Tenth Annual Safety Congress to attend a reception and dance to be given at the Copley Plaza Hotel at 8 o'clock, Monday evening, September 26.

SECOND DAY

Tuesday, September 27, 8:30 a. m.

Auditorium, First Floor

GENERAL ROUND TABLE.—Chairman, Geo. T. Fonda, Manager, Safety and Compensation Division, Bethlehem Steel Company, Bethlehem, Pa.

Safety Bulletins:

- The Ideal Bulletin.
- Home-made Bulletins.
- How to Use Bulletins Effectively.

Tuesday, September 27, 2 p. m.

Auditorium, First Floor

A B C SESSION.—Chairman, S. H. Kershaw, Fire and Accident Prevention Engineer, Hercules Powder Company, Wilmington, Del.

Fundamentals of Safeguarding.—G. E. Sanford, Safety Engineer, General Electric Company, West Lynn, Mass.

Getting Results from Plant Safety Committees.—R. C. Salisbury, Supervisor of Safety, Interstate Iron and Steel Company, Chicago.

The Essentials of a Plant Safety Organization.—J. F. Tinsley, General Manager, Crompton & Knowles Loom Works, Worcester, Mass.

The Foreman—the Determining Factor.—Harry Guilbert, Manager, Safety Department, Haskell & Barker Car Company, Michigan City, Ind.

How to Promote Safety Education in a Plant.—A. S. Regula, District Chief Engineer, Liberty Mutual Insurance Company, New York.

Tuesday, September 27, 4.30 p. m.

Auditorium, First Floor

MOTION PICTURES ON SAFETY.

The Awakening.—An industrial picture produced by the Employers' Mutual Liability Insurance Company, Wausau, Wis. (Two reels).

Wasted Millions.—A film illustrating safe method of handling, piling, and storing materials. Produced by the Economy Engineering Company, of Chicago, in collaboration with the Accident Prevention Department of the Michigan Mutual Liability Company. (One reel.)

The Menace.—A fire prevention film produced by the National Automatic Sprinkler Association. (One reel).

Section Meetings

Tuesday, September 27, 10 a. m.

Room 446, Fourth Floor

AUTOMOTIVE. Chairman, Robert A. Shaw, Department of Safety and Factory Hygiene, Ford Motor Co., Detroit. Vice Chairman, August L. Kaems, Safety Engineer, The Simmons Co., Kenosha, Wis. Secretary, R. F. Thalner, Safety Engineer, Department of Personal Service, Buick Motor Company, Flint, Mich.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Fundamental Principles of Safeguarding (illustrated with slides).—J. A. Dickinson, Mechanical Engineer, United States Bureau of Standards, Washington, D. C.

Punch Presses—Design of Dies, Automatic Feeds, and Safeguards (demonstrations with equipment).—A. L. Kaems, Safety Engineer, The Simmons Company, Kenosha, Wis.

(*Continued on page* 141)

Is Prophylaxis Feasible in Arsenous Dust?

A Symposium of Opinions

IN copper smelting plants the men at the treaters, the loaders, railway crews, dumpers, furnace men, refiners, kitchen wheelers and men barreling all come in contact with tons of arsenous dust daily, recently wrote Dr. Lawrence G. Dunlap, eye, ear, nose and throat surgeon, in the *Journal of the American Medical Association*, from his experience in the arsenic department of the largest copper smelter in the world.

"This arsenous dust is breathed into the nose, and coming in contact with moisture, forms arsenous acid, which causes necrosis of the septal mucosa." If not arrested immediately this develops into a perforation which can be controlled only by persistent local medication. Failing of spontaneous cure, the case may require surgical attention.

PREVENTIVE MEASURES DEPRECATED

Dr. Dunlap mentioned, among the preventive measures ineffective in connection with the breathing of arsenous dust, gas masks, because "not feasible for a workman on an 8-hour shift," and nose guards, respirators, etc., as leading to severe dermatitis.

Camphor-menthol ointment and "baghouse" salve were the only prophylactics endorsed by Dr. Dunlap, and he cautioned that their use must be constant.

SAFETY ENGINEERING INVITES A DISCUSSION

In view of the high development of this class of devices SAFETY ENGINEERING asked prominent manufacturers for an expression of their opinion on Dr. Dunlap's statement, and also, in turn, called to the attention of Dr. Dunlap the expressions which were received from the manufacturers.

If there is an existing and ineradicable hazard from arenous dust it should be recognized and combatted by either mechanical or chemical means.

The discussion is still in a very incomplete form, but we think it will be interesting to present it, hoping that it will call forth further comment from both medical men and safety engineers.

Preventive Measures Defended

To the Editor of SAFETY ENGINEERING:

SIR: I do not agree with the statement that gas masks, respirators, etc., are not satisfactory. The gentleman who has written this article has certainly not studied the situation, and is not well advised. The statement as it stands does not strike me as reasonable.

G. O. SMITH,
Vice-President and Chief Engineer,
American Atmos Corporation.
New York City.

Says Doctor Is Not Quite Up to the Minute in Some Ways

To the Editor of SAFETY ENGINEERING:

SIR: In our estimation this article as written is the idea of a man thoroughly familiar with the physiological action of arsenic, but not quite thoroughly up to the minute on proper dust protection. Arsenic dust, arsenic oxide, or arsenous acid are all ordinary powders and are not hard to filter out by means of the ordinary "Dustite" filter. These filters have been tested with powders much finer than the various arsenic compounds and have proved effective.

We must admit that the average method of protecting against dust in smelting plants is not all it should be. These men frequently take a rag and tie over the nose and mouth and make themselves believe they are safe, and as you know cannot thoroughly exclude poisonous dust by such method.

Cotton plugs placed in nostrils is a ridiculous idea on the face of it and if you care to try this method of filtering out dust, we think you would be amused by the results, as before the plugs are in the nostrils full 60 seconds you will be breathing through your mouth.

Gas masks, if properly adjusted, should be adequate protection against arsenic dust. However, we think this method is entirely unnecessary and too cumbersome for work of this character.

In the doctor's article it is stated that nose guards and respirators cause an accumulation of moisture around the edges in contact with the face, resulting in severe dermatitis. This problem could be readily solved by greasing all portions of the face at the points where respirators are in contact. The ordinary petroleum preparations such as vasoline and similar easily obtained articles are suitable for this purpose.

We would be pleased to send to the author a sample or samples of the "Dustite" respirator. We would like to have these people try the "Dustite" respirator at this class of work. There are some respirators on the market that cannot possibly be made to fit evenly and closely to the facial lines. Consequently the author may have condemned respirators as a whole, but we would like the opportunity of having him make an amendment to his article.

We believe that the doctor has investigated the physiological side of the safety problem without due regard to the practical preventive safety methods in use.

There will naturally be some objections to the use of grease on the face when respirators are used because of the fact that oils or grease cause rubber to soften and deteriorate. However, if respirators are washed carefully daily and the men take proper precautions in greasing their faces each time they adjust the respirators, very little trouble will be experienced. Of course, it is important that a respirator fit as near as possible to the facial lines, as even contact must be had. Otherwise the workman might be inhaling arsenic dust through some unexpected opening.

We have had comments on various occasions regarding the use of the respirator in handling lime and similar compounds. It is often stated that a respirator cannot be worn at this work because the lime accumulates around the edge of the respirator and in contact with the moisture from the face burns. This same difficulty can be eliminated by the use of grease applied at all the points of contact.

As stated in SAFETY ENGINEERING'S letter, this problem is becoming very interesting and if there are any further developments we would very much appreciate advice.

F. M. ROCKWELL,
Service Bureau, Willson Goggles, Inc.
Reading, Pa.

Protecting the Worker Against Arsenic Dust

To the Editor of SAFETY ENGINEERING:

SIR: Men employed in the copper smelting plants are constantly in danger from breathing arsenic dust which accumulates through the refining of copper. This dust is very injurious and will if inhaled cause sickness and death.

Several satisfactory protectors are made that will take care of the worker, providing these protectors are used when the worker comes in contact with the dust. Many times the men will take these protectors off and endanger themselves to the dust, realizing all the time that they are in danger of breathing this dangerous dust.

Protectors that have been used in this industry and have been found very efficient are known as gas masks, bag-house helmets, dust hoods, respirators with dry filters and face masks.

The most difficult part of preventing the inhalation of these fumes and dust is not what to recommend, but to see to it that the protector given the worker is worn instead of discarded by the worker who wishes to take the chances that the dust and fumes will not harm him. Many times this is more the case than that the protector is faulty.

FREDERICK WAHLERT,
Pulmosan Safety Equipment Co.
Brooklyn, N. Y.

Comments by Dr. Lawrence in Rebuttal

To the Editor of SAFETY ENGINEERING:

SIR: Your letter, which came during my absence at an American Legion Convention, was in relation to statements made in an article on "Perforations of the Nasal Septum Due to Inhalations of

Arsenous Oxide," *Journal of the American Medical Association,* February 26, 1921. At the start be it said that I am writing this letter in no spirit of antagonism or "high and mighty" defense of my statement as to the unfeasibility of wearing gas masks, for I would be only too pleased in any efficient measure or means to reduce arsenic disabilities. These opinions of mine may be spoken of as practical shop observations, in contrast to theoretical swivel-chair ideas. Our safety engineer, Robert Kelly, and the superintendent of the Arsenic Plant will bear me out.

To refute Mr. Rockwell of the Willson Goggles, Inc., I may say that we have used grease on the face of the contact points of the respirators, but this grease soon wears off, and the respirators are not comfortable to work in. I admit that Mr. Wahlert of the Pulmosan Safety Equipment Company is correct when he states that, "*providing the protectors are used,* they will take care of the worker," but you and I know that even in trench warfare, the men were in many instances driven to removal of their gas masks, as they chose suffering or even death from gas to mask suffocation, and such gas masks, while efficient, would not be feasible for one working an eight-hour shift.

Please understand that this is not in any official capacity for the company that I am writing, but as an eye and ear surgeon to the company who would really welcome any sort of prophylaxis for the arsenic conditions.

I trust that I may hear further from SAFETY ENGINEERING and its readers.

LAWRENCE G. DUNLAP.

Anaconda, Mont.

What Are the Dangerous Jobs?

By James A. Tobey

THERE used to be a song called "A Policeman's Life Is Not a Happy One." This statement may or may not have had reference to the dangers of his duties. At any rate, it was all wrong if it had. A policeman's job is one of the safest of all. In fact, out of 17 classes of positions in which the deaths from accidents have been studied, the only classes which are safer than policemen are farmers, manufacturers, and telephone and telegraph workers (including linemen). This last fact is also surprising, because we often read of linemen being electrocuted and are prone to consider the work of climbing poles and fixing wires as risky business.

These interesting facts are brought out in data assembled by Miss M. M. Hulst, statistician with the American Red Cross. In collecting figures for industrial accident deaths in the United States for 1918, the latest year for which data are available, it was found that there were 21,356 total accident deaths. The number of men employed in the industries in that year was 30,106,256, so that the death rate was 7.1 per 10,000 employed. In other words one man out of every 1,410 employed was killed in an accident. This is 45 per cent of the number of Americans killed in battle during the World War.

What are the most dangerous jobs? The types of employment studied include mining, navigation, fisheries, electricians, steam and street railways, quarries, lumber, smelting, building, iron and steel, teamsters, police, telephone and telegraph, agriculture, manufacture, and miscellaneous. The statistics show that the miners lead in deaths from accidents. The rate for coal mining is 33.8 per 10,000 employed, and for metal mining 33.4 per 10,000 employed. The rate for the two combined is 34.3. Next to mining, navigation claims the most deaths, with a rate of 31; then come fisheries with 30, electricians with 22.5, steam and street railways with 19.4, and quarries with 18.3. The lumber industry kills 15 per 10,000 employed, smelting (not iron) and ore dressing 12.5, building also 12.5, iron and steel 11.4, team-

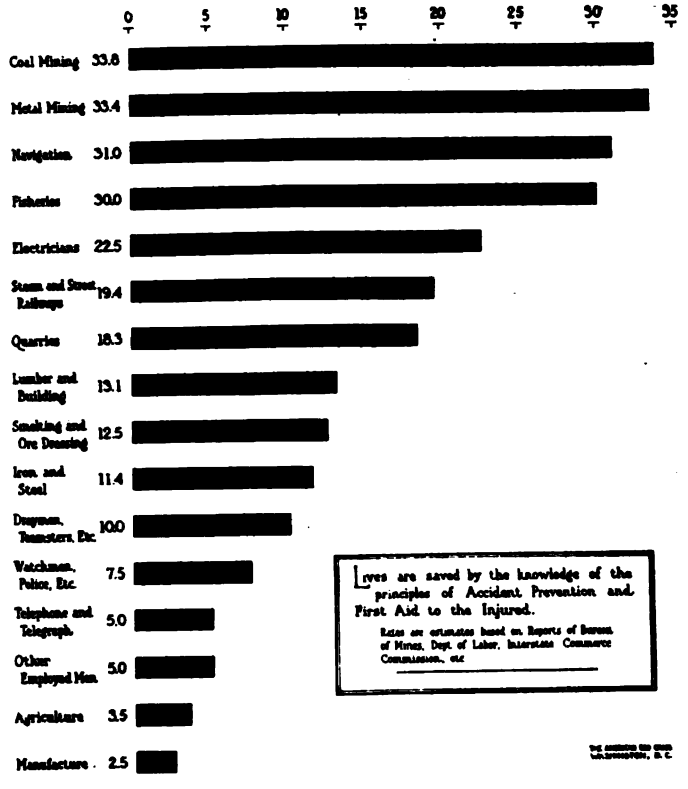

Fig. 1.—Persons Killed by Industrial Accidents in the United States During 1918; Number of Accident-Deaths per Each 10,000 Employed

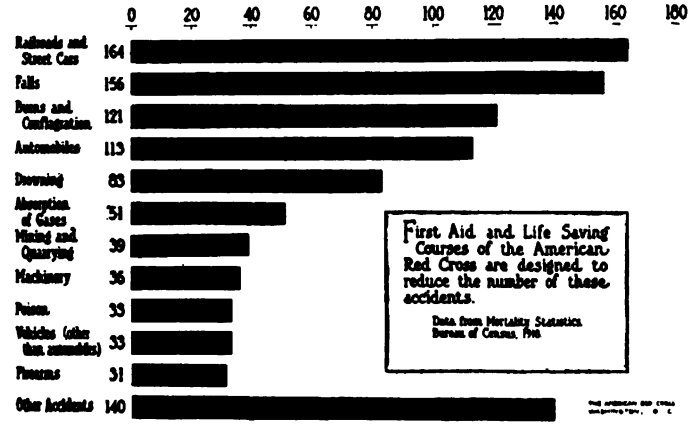

Fig. 2.—Total Accident-Deaths in the United States During 1918; Number per 1,000 from Each Cause

sters, draymen, etc., 10. When we come to the lower rates, we find police, watchmen, etc., with only 7.5, telephone and telegraph workers with 5, miscellaneous also with 5, agricultural workers with 3.5, and manufacture with only 2.5 per 10,000.

The relative rates of accident deaths are shown graphically in Figure 1. The average rate, as already stated, is 7.1 for the total number. It would, therefore, come between teamsters and police. Thus 12 industries kill more than the average, and 5 kill less. It is interesting in this connection to note that the greatest number of workers is employed in agriculture, which has 10,613,083, or about one-third of the total of 30,106,256. There were 5,145,656 employed in manufacture, which includes the clothing and shoe industries, and such. These are the safest jobs and comprise more than half the people. When we compile a rate omitting these two industries we find the average much higher,—11.4 per 10,000, in fact. The accompanying table shows the number employed in each industry, together with the accident death rate.

(1918). The toll of accident deaths was over 83,000 in that year, which is more than the deaths from cancer. Accident deaths constituted 4.6 per cent of the deaths from all causes in the United States. The deaths in industrial lines aggregated about one-quarter of the total from all accidents. Figure 2 shows the causes of accident deaths.

In addition to the fatalities, there are of course many accidents which result only in disability. Miss Hulst estimates that there were 3,400,000 such disabilities due to occupation in 1919. The U. S. Employes' Compensation Commission reports 19,354 injuries occurring to civil employes of the government in 1919. Of these 587 resulted in death.

Accidents cost money. The government spent $3,507,148.55 in compensation during 1919. The State of Wisconsin has spent $1,000,000 for compensation in five years. Professor Irving Fisher estimated in 1909 that the economic value of life was $525 for each year of life. Economic conditions have, of course, greatly changed since then. Using the index numbers of the United States Bu-

INDUSTRIAL ACCIDENT DEATHS IN THE UNITED STATES, 1918

Based on estimates from the best obtainable sources.*

Industry Group	Men Employed	Total Accidents	Rate per 10,000 Employed
TOTAL	30,106,256	21,356	7.1
Agriculture	10,613,083	3,715	3.5
Manufacture	5,145,656	1,286	2.5
Building	2,413,283	3,039	12.5
Steam and Street Railways	1,839,229	3,569	19.4
Coal Mining	762,425	2,580	33.8
Lumber	635,638	953	15.0
Iron and Steel	527,150	603	11.4
Draymen, Teamsters, etc.	407,577	408	10.0
Metal Mining	182,606	646	33.4
Watchmen, Police, etc.	176,974	133	7.5
Navigation	147,478	457	31.0
Telephone and Telegraph (Inc. Linemen)	134,071	67	5.0
Electricians	134,071	102	22.5
Quarries	68,332	125	18.3
Fisheries	67,036	201	30.0
Smelting (Not Iron) and Ore Dressing	61,708	77	12.5
Other Employed Males	6,789,939	3,395	5.0

* Estimates based on reports of the U. S. Bureau of Labor Statistics and accident rates of large industrial groups in insurance companies, etc.

It is interesting to compare the number of accident deaths in industry with the total in this country in the same year

reau of Labor Statistics for increases in the cost of living, this figure of $525 grows to $798 for the year 1918. Thus,

a person 20 years of age was worth $6,080, a person of 30 was worth $6,332, and so on. While the average age of those killed in industrial accidents is not known, we can safely estimate according to the above figures that the economic value of each one was at least $6,000. Multiplying this by the total number of deaths from accidents, we get the figure of $128,136,000, which represents the loss in money caused by these 21,356 deaths.

The loss of wages to workers in the case of disability also runs into enormous figures. For instance, the U. S. Employes' Compensation Commission states that while $622,696.97 was paid in compensation, it covered only about 44 per cent of the wage loss due to temporary total disability among government employes.

In the year 1919 there was an average of 11,000 accidents a day among workmen, and over 680,000 men were laid up for over four weeks from non-fatal accidents.

What are we going to do about such conditions, and what *are* we doing about them? Fortunately, the safety movement in the United States has received great impetus during the past few years. Government departments, health officials, the Red Cross, private organizations like the National Safety Council, and civic associations have done much to bring to the attention of all the people the desirability and the necessity of safety-first. The data outlined above, however, emphasizes how much more is yet to be done. Safety is not merely a matter of education, but is bound up with economic questions, the development of mechanical safety devices, increased standards of health, and many other factors. The control of accidents is one of the big problems of our energetic American life. It is one that must be faced and faced now.

Reducing Street Perils in China

THE Associated Press is responsible for importing this interesting news from the Flowery Kingdom, apparently a cable dispatch from Shanghai, under date of August 30, viz.:

SHANGHAI, Aug. 30 (AP).—As a means of preventing automobile accidents the Health Precautionary Association, an organization composed of leading Chinese of Shanghai, recently prepared a list of suggestions, among which are several of engaging novelty. The suggestions, which were adopted at a meeting after lengthy debate, were submitted to the municipal council on the international Settlement. Among the measures that the organization advocates are these:

"All motor cars have rubber tired wheels and run without noise. It is too late to blow a horn when a car has already collided with a pedestrian. A car should have a very small bell attached to one of the front wheels, and this bell should be kept ringing all the time, so that when pedestrians hear it they can get out of the way. This bell should be half the size of a bicycle bell. Each car should have a speed limit, but the fire brigade, doctors' and police motor cars should be exempted.

"A chauffeur should wear a brass badge on his breast. The badge should be three inches in diameter and should have his name and the number of his license in English and Chinese inscribed thereon. The badge should be issued by the municipal council at a few taels each. Then a man not licensed will not dare drive a car.

"All motor trucks should have rails or iron chains around the cars to insure safety and in case of collision cargo will be prevented from falling and injuring pedestrians. Cargo should not be piled too high to prevent danger when passing over bridges.

"There should be one licensed chauffeur and an assistant to take charge of each motor car or truck. The assistant should sit behind and keep a lookout when the car turns around, goes backward, enters or leaves the garage. The owner of the car will not mind spending a little money in employing an assistant chauffeur.

"After a person is killed by a motor car a wax image of the decedent should be made and placed in a room, and any chauffeur who causes injuries to others should be locked up in this room so that he will see the image and feel sorry. This may cause him to repent. This has been introduced in America and has produced successful results."

Education in Safety Engineering as Given at the Lynn General Electric Engineering and Apprentice School

By N. M. DuChemin

of the General Electric Company

Proceedings of the American Society of Safety Engineers

WHILE outlining a plan of safety education in our accident prevention campaign at the Lynn Works, we decided that the Engineering and Apprentice Schools presented an excellent field for fruitful labor. Here we were training many of our future executives; it was fitting that they should be graduated from the school at least cognizant of our aims and objects in this campaign to reduce our industrial accidents. Our idea at first was to get the students together probably three or four times a year and give them a general talk on some phase of industrial accident prevention. The school authorities, however, were generous and they made a place for safety in the curriculum, allowing one lecture a week to the graduating classes of the Engineering and the Apprentice Schools. This was a concession for which we were not prepared, and at the same time, an opportunity that we were loathe to reject. It behooved us, then, to prepare some program of lessons for this assignment. The outline which I submit herewith is the result.

We have divided the course into ten lectures of approximately one hour's duration. Having introduced the subject in the first lecture, we take the class in the succeeding lectures through the various stages represented in our plant, from the building construction through the boiler-room and power station, to the machine shops and machines themselves. Seven of the lectures are devoted to the mechanical problems presented at the various points from the generation of power to its application at the point of operation in the work-shop. The last three lectures deal entirely with the human element in the safety campaign.

The use of blue prints and photographs and especially that of a blackboard is indispensable; we make it a point to illustrate by one or the other of these methods the various types of mechanical guards discussed.

Lesson 1. *Introductory*

We find that most of our students have but a vague idea of the importance to industry of this accident prevention work. An explanation of the introduction of Workmen's Compensation Acts in European countries and in the United States is followed by a comparison of the advantages of such laws over the old "Common Law Rights." The effect of the application of the workmen's compensation laws upon the efforts to prevent accidents in industry and the magnitude of these efforts in many large corporations are then discussed. Finally we explain with the aid of graphs our own findings in this respect, our attempts to reduce accidents by mechanical guarding and the analysis of the causes of our accidents.

The advantages to be gained by effective safety work suggests the subject of "Industrial Insurance." In a general way the student is made familiar with the method of computing the premium which the insured concern must pay for its policy. The prevailing idea seems to be that for a certain fixed yearly premium the insurance company carries the insured industries' policy, so that an explanation of the "Manual," "Schedule" and "Experience" ratings, with their application and effect upon the annual premium, usually interests the students and shows them what is probably the greatest *raison d'etre* of the safety engineer.

Lesson 2. Fire Prevention.

In my mind, at least, most disasters involving great loss of life and of property are usually associated with fire. With this thought in mind we have devoted our first specific lesson to the subect of fire prevention. By way of introduction a brief account of a few memorable fires with consequent loss of property and life will impress upon the student the importance that this subject merits. After this we consider the various types of building construction and their relative hazards. This of course leads readily into the subject of exit facilities. Methods of protecting wall openings bring out the importance of "fire doors," shutters and "water curtains." Then the dangers presented by the stairways, elevator shafts and belt openings are taken up, with some methods by which these are reduced or eliminated.

Using as examples, whenever possible, buildings in our plant or familiar buildings in the city, we give attention successively to horizontal exits, smoke-proof towers, interior enclosed stairways and various types of outside fire-escapes. This last mentioned subect has brought numerous comments from the students upon the improper construction of many outside fire-escapes upon the prominent buildings in our city. Brief reference is made to other means of exit, such as elevators, chutes, ladders and poles. The capacity of stairways invites the problem of the sufficiency of some familiar stairways about the plant. The working of such a problem fixes in the mind of the student the data used in making such a calculation.

Protective devices naturally brings up the thought of automatic sprinklers. We have found that the fusing of a sprinkler head (of course not one attached to a main) by the holding of a lighted match under the fuse gives an excellent illustration of what would happen in event of fire. The passing around the class of the disassembled head makes the student thoroughly familiar with its construction. After a word upon the subject of fire hose and an explanation of the workings of chemical extinguishers, we explain the method of fire-drills in use in our plant, and the functions of our plant fire brigade. Turning the student's thoughts towards the cause of fires, we speak of the storage of flammable liquids, the removal of waste and the methods of fighting electrical and oil or other flammable liquid fires.

Lesson 3. Safety in the Boiler Room and Power Station.

Our first thought is to impress the student with the potential destructive force in the tremendous amount of energy stored up in all boilers. The history of a boiler explosion and the consequent destruction will readily get this result. An analysis of the cause of explosions brings out the importance of regular "blowing down" and examination of boilers for corrosion. Follow this up with a word on safe method to be employed in firing up a new boiler or one that has been closed down for repairs, the cutting in of the boiler on the line, the use of non-return valves, and the importance of some safety stop independent of the governor mechanism. Some stress should be laid upon the importance of the safety valve, its location, so that employes will not be scalded by the exhaust, and frequent testing to insure its proper functioning. Finally in connection with boilers, it is well to point out the need for guarding against injuries to employes from the breaking of water gauges; several different methods are shown and explained.

The mechanical guarding of reciprocating engines is the next subject to which we turn our attention. We emphasize the need for enclosing cranks, connecting rods and ball governors. The need for standard railing protection for flywheel pits where they exist, with a word of caution to avoid the temptation of getting more power by speeding up the engine covers the thoughts presented with regard to fly-wheels.

From the reciprocating engine or turbine to the electrical machinery is but a natural step. The need of insuring the grounding of all exposed non-current carrying parts of electrical rotating machinery is a subject discussed. We advocate the guarding of switchboards to prevent accidental contact with current-

carrying parts, the provision of proper illumination, and the precaution of having switches clearly marked. A brief reference to the use of remote control apparatus and the need for all electrical workers to be familiar with the prone-pressure method of resuscitation marks the close of this lesson.

Lesson 4. *Power Transmission.*

The fourth lesson deals with the intermediate stage between the point of power generation and its application in the factory. There are various problems of shafting to be discussed. In connection with the main drive we touch on clutches, fast and loose pulleys and independent automatic engine stops.

The question of eliminating accidents to oilers leads one to the thought of methods of automatic or semi-automatic lubricating, and to the design of safe couplings and collars. With the aid of blackboard sketches reservoir oiling systems are outlined, methods of removing the hazards from existing couplings and collars are explained and new designs presented to the students. Power transmission usually implies the use of belting, and the existence of a belt generally calls for mechanical guarding. Drawings of guards of several types applicable to overhead, horizontal and vertical belting will aid in giving a general idea of the problems of safeguarding moving belts.

The three systems of transmitting power, main drive, group drive and individual motor drive, will suggest many guards that should be called to the students' attention. In connection with the main drive most of the points have been covered except perhaps the need for a mechanical belt shifter. Group drive in addition to the method of control, frequently invites reference to the safeguarding of shafting mounted under benches at which female operators are employed. We have this problem in some of our Coil Wind Departments, and the skirt guard is introduced and outlined. With regard to the individual motor drive there is the need for proper mechanical guarding of the belt, chain, or gear drive between the motor and the machine and the electrical hazards eliminated by proper grounding of the motor frame and the use of safety switches. This marks the end of the fourth lesson, the student has been introduced to the factory and the next step is the consideration of machines and machine tools.

Lesson 5. *Wood-Working Machinery.*

The wood-worker, as a rule, insists upon a clear vision of the point of operation of the machine upon which he is working and the prospective safety engineer should be informed of this attitude or his ventures in the carpenter and pattern shops may not be particularly successful. A guard which is universally unpopular is seldom effective and may bring discredit upon other satisfactory guards. To avert accidents in a wood-working factory the human element will have to be depended upon in a greater degree than in the metal-working departments. We find that it is much easier to "sell" a mechanical guard to a machinist than to a carpenter. Of course, we do not teach our students to dispense with mechanical guards upon wood-working machinery. The use of spreader and hood upon circular saws is advocated and outlined, and the safe-guarding of swinging circular saws explained. The student is also instructed upon the safety installations for band saws, jointers, shapers and sanding machines. The use of circular heads and guide blocks for pushing short pieces upon jointers or buzz planers is emphasized. The lesson is brought to a close with a discussion of exhaust systems and the need for some abrasive surface upon the floor near wood-working machinery.

Lesson 6. *Metal-Working Machinery.*

After calling the students' attention to the common hazards of machine shops, such as exposed gears and belts and projecting set-screws, we take each of the more important machines separately, pointing out the dangerous elements and the methods of safe-guarding them.

The first machine considered is the drill press. Spindle guards, dogs to sustain the weight of spindle if counterweights become detached, and safety drifts are the chief points of interest mentioned about these machines. Punch

presses are given greater consideration than most other machines. Fly-wheel and treadle guards of various types are mentioned. We discuss the possibility of using mechanical feeds of the sliding, rolling and rotating varieties. Sweep guards, both horizontal and vertical are explained and various types of picks and pliers exhibited. In turn we talk of the guarding of planers, lathes, shapers and milling machines, illustrating the guards by blackboard sketches, photographs or blueprints. No machine shop is complete without its emery wheels, and the problems which they bring in their wake for the safety engineer. The designing of proper hoods and exhausts, the mounting of the wheel, the using of safety flanges of correct shap and dimensions, are some of the thoughts presented upon this subject. A brief mention of the use of goggles and of glass shields in connection with emery wheels and the care and design of wheel-dressers marks the end of the sixth lesson, which is somewhat longer than the average and could easily be expanded to make two lectures, each of an hour's duration.

Lesson 7. Plant Equipment.

This lesson deals with a variety of subjects, any one of which might offer material enough for a lecture in itself, but since we must cover the wide scope of safety engineering in ten lessons, we can only mention briefly the various mechanisms that make up the plant equipment and call attention to a few of their more common hazards.

The thoughts suggested in connection with elevators include enclosed shafts, landing doors, gates, covers for top of freight elevators, warning chains upon cars. bevel projections at landings, interlocks. pit-clearance, drums and sheaves, the care of cable and the need for qualified operators.

On the subject of cranes, we speak of electric travelling cranes, the use of proper foot-walks for repairmen and operators, the guarding of shafting, the operation of limit switches on hoists, type of bumpers and the provision of permanent ladders and platforms by which operators may ascend in security to the crane cage.

Only a few transportation problems are mentioned, such as the assurance of unobstructed view for motorman or engineer in shifters, the necessity for frequent inspection of brakes on shifters and derricks, the maintaining of track clearance and the prohibition of flying switches.

In a general way we take up the question of ventilation, the requirements of the individual, the effects of heat and cold, and methods of ventilation, such as exhaust, window and Plenum ventilation.

Illumination suggests the discussion of the intensity of light necessary for various types of work, the use of natural and artificial light and their effect upon accident frequency.

This lesson is usually concluded by an inspection of some building and a section of the yard by the class. In the buildings, floors are inspected for clearance of aisles, maximum loads, the placing of machinery and cleanliness. In the yard the student's attention is directed to the piling of material, the condition of ladders, general orderliness, and the maintenance of clearance on railroad tracks.

Lesson 8. Organization.

The organization that the safety engineer builds up to assist him in his work in the plant will determine in a large measure the success or failure of his efforts. No definite rule can be laid down as to just what a safety organization shall be, because the size of the plant, the work carried on and the type of employes engaged will have to be considered in every case, and the safety personal adapted to suit the peculiar needs of the plant. Several successful safety organizations are explained to the students, so that they may be familiar with what various concerns are doing in this respect.

We do insist upon the need for committees of both employes' and management's representatives; in fact, we are heartily in favor of joint committees throughout the plant safety personnel. We discuss methods of directing general and departmental committees, the need for uniformity of reports, minutes, etc., and the encouragement of departmental committees to solve their own problems

with foremen involved. Competition between committees representing departments, usually results in a reduction of accidents. There are various ways of stimulating this good-natured rivalry and the student should know of them. How to keep records, and what to publish on weekly or monthly reports, concludes the subject of organization.

The result of a safety campaign is to stimulate thoughs of accident prevention in the minds of the workmen and this frequently brings forth many excellent suggestions from them. In order that these suggestions may be properly handled, the safety engineer should be familiar with some suggestion system and install it throughout the plant. Following up these suggestions, adopting the useful ones and rejecting the impractical, will call for much good judgement and tact from the safety engineer. Adopting a suggestion is the easier of the two, and the student should know how to appreciate the thoughtfulness of the man whose suggestion is impractical and the importance of explaining to the individual why his idea cannot be put into practice. A safety suggestion system is a big factor in any safety organization, and we feel that our students should recognize this and be in a position to use it to advantage.

Lesson 9. Advertising.

This lesson is devoted to the various media used in accident prevention campaigns, and some of the best practices to follow in order to obtain the desired results. Safety bulletins and bulletin boards furnish material for a lengthy discussion. We consider the advantage of having bulletin boards for safety material only, the illuminated and other types of boards and their location. Great importance is laid upon the selection of the bulletins to be used. The relative position of bulletins upon the board gives the bulletins themselves varying degrees of importance. One should aim to have bulletins brief and pointed. Some departments where certain nationalities are employed, are reached more effectively by colored bulletins. The student is told of the importance of illustration and the style of type used in the make-up of the bulletin, and of the posting in departments of bulletins that are peculiar to the work carried on. A few of the possibilities of blackboards as an advertising medium are illustrated. No other medium lends itself as readily to rapid inexpensive change and local color, and none is so easily manipulated.

Copy writing for shop magazines is taken up. The student is given a few pointers upon the style to use in his writings, and what to write about.

No campaign for the prevention of accidents would be complete without departmental talks to the employees. We attempt to direct the future engineer's activities along these lines. The same arguments cannot be used with men as with women employes. In speaking to men, he must use a rational or dollars-and-cents argument, appeal to the sense of fear, competition, or fair play, using occasional analogies and figures of speech familiar to the man in the shop. On the other hand, in speaking to women employes, his language should be correct and free from slang and technical lingo, and his arguments should be based upon health, beauty, maternal instinct, sympathy, cleanliness and economy.

During this lecture, by the exhibition or distribution of sample bulletins, examples of copy and brief imaginary, departmental talks, the student is given a working knowledge of such phases of advertising as a successful safety engineer must know.

Lesson 10. Selling Safety.

The average young man fresh from the technical school or college, when he finds himself for the first time in charge of a detail of workmen, is at a loss to know how to "break the ice." He wants to get acquainted with his men, but he just does not know how to start a conversation or what to talk about. The new safety engineer in a large plant is in a similar position to that of the new foreman, except that he has more "ice" to break. Unfortunately that is something he is seldom taught in school, and if he is not born with a natural ability to mix, his debut as a safety engineer is not very auspicious.

This quality of "mixing" can be ac-

quired or cultivated if students are guided by a few simple rules, and we attempt to do this. A conversation, they are taught, can always be started by a common-place "Good morning." The next step is to find out by the work, the man's appearance and by a few chance questions, what the man is interested in outside the factory—his hobby. Having found that, the young engineer has a common subject upon which he can always engage Mr. Machinist or Mr. Moulder, as the case may be, in a conversation. Frequently the man in the shop has some rare hobbies—in my own experience I encountered one otherwise normal individual who devoted his spare time to the study of theosophy. That may mean that the first conversation will be, as in my own case, somewhat one-sided, requiring the safety engineer to become a sympathetic, intelligent listener —not at all an easy task; but if he wants to make a life long friend of Mr. Man-in-the-Shop, he will get posted on that hobby and spring something new about it the next time they meet. Another angle of attack is to get posted on the man's family connections, especially if he is a married man and a father. A knowledge of the history and customs of the fatherland or motherland, whichever way they look at it, is frequently advantageous with our foreign-born workers. Such an acquaintance with Mr. Man-in-the-Shop is turned to advantage in this manner. Tony is not wearing his goggles while chipping. The young safety engineer happens along, and he might tell Tony to put on those goggles and no doubt Tony would—temporarily; but instead he talks to Tony not about safety but about Garibaldi, D'Annunzio, Tettrazini or perhaps Tony Junior. As he is about to leave Tony, who is now in a friendly frame of mind he says "By the way, Tony, why don't you wear your goggles while you're doing that job?" Tony usually usually does, and he does it not because he is influenced by fear of consequences if he should disobey, but because his frame of mind enables him to accept the suggestion of the safety engineer as friendly advice.

What applies to Mr. Man-in-the-Shop about hobbies and nationality applies also to the foreman. He too has his hobbies, and it is up to the young safety salesman to know them. In whipping a foreman into line the young engineer must be patient and consider that whatever he does, at first, must not interfere with production. No matter how poor a record the department has, there is some good thing there and the foreman would rather hear about that than about all the bad things in the department. Words of censure rather than praise are usually the lot of the foreman, in his position between the employes on one side and the superintendent or manager on the other, and he is in need of encouragement rather than criticism. The use of subtle flattery —an art in which Europeans excel and which we Americans do not employ sufficiently—will work wonders for the new engineer in his dealings with foremen. After the foreman's confidence has been gained, safety can be sold in the department.

Above all things don't preach safety. Workmen and foreman, in fact most people, will avoid the preacher. The safety man's presence brings thoughts of safety to the sub-conscious minds of those who see him—that is sermon enough and it is accentuated if he leaves without saying a word about safety. That, in a few words, is the gist of our last lesson on "Selling Safety."

CONCLUSION

In presenting this outline of lessons to you, we would like to remind you that they have been written for our own particular use. We realize that there are many phases of safety engineering, such as foundry, blacksmith, rubber and textile work, which we have neglected entirely, but our time was limited and we were forced to adjust the course to the time allotted and to our own plant conditions. In all, since last August, about 100 students have attended this course of lectures. Many of them are now graduated from the Apprentice and Engineering Schools, and are executives at our plant in Lynn.

One thing I have noted in my limited experience, and that is, the need for a real practical course in safety engineering—a course with supplementary charts

or lantern slides for class-room use, and a course that gives the lecturer something concrete to talk about. Most of the courses that I have seen are not specific; they make interesting reading but the subject is treated in a broad general way. If the American Society of Safety Engineers would lend its efforts to formulating a practical Course in Safety Engineering—and no other organization is better fitted for such a task—it would be supplying something of which the safety world is in urgent need. Such a set of lectures could be outlined and each subject assigned to a specialist or group of specialists for preparation. The joint production of such men would no doubt be a course that could be considered the last word in safety engineering, and one that might easily be introduced in the curriculum of many technical schools and colleges, so that the safety engineer of the future may not be unduly handicapped through lack of proper fundamental training as he finds himself under present conditions.

Safety Features in High Tension Generating Stations and Substations

By M. M. Samuels

of the J. G. White Engineering Corporation

Proceedings of The American Society of Safety Engineers

ON high tension work it is not necessary to make any distinction between hazard to life and limb and hazard to property. It would require considerable stretching of the imagination to conceive a case where the addition of hazards to the operator would make the apparatus or surrounding property safer. It may therefore be stated as a first postulate that on high tension work *safety to life and limb and safety to property are identical.*

At a time when industry is struggling to recuperate and regain its old foothold, it would be folly to suggest the introduction of safety means in such numbers and in such manner as would make high tension installations unnecessarily expensive, because this might in some cases make high tension developments so expensive that they could not be put through at all. Even though this would mean *absolute safety,* I do not think that safety engineers desire to go that far. However, as it is well known that the simplest arrangement of stations is the most economical, so it may be stated as a second postulate that *the simplest arrangement of stations is also the safest arrangement.* The introduction of safety features, therefore, if reasonably done by skilled engineers, will generally not require any great additional expenditures.

SIMPLE DESIGNS BEST

In spite of the fact that the best design of a station from all points of view is the simplest design, there is no doubt that a great many of the existing power stations and substations in this country as well as abroad are unnecessarily complicated, due in all probability to lack of skill on the part of the designer. A simple design when completed appears as though it could not be any different, as though it were the only possible and self-evident way of arranging the equipment in the station. As a matter of fact, however, the simplest design is the most difficult and requires the greatest skill, since in very few cases will a designer think in the beginning of the simplest way. It is peculiar that to most designers the most complicated way offers itself first, and also that complicated designs are generally appreciated much more than simple designs. The

remark is often heard: "This is a very complicated station; it must have taken a great deal of engineering skill to design it," whereas, the fact of the matter is that the lack of engineering skill is just what made it complicated. This attitude is often discouraging to a designing engineer who is attempting to bring out simple designs; he meets with so much lack of appreciation of the simplicity of his designs that it is often a temptation, if he is not very independent in his ideas, to make a design complicated in order to obtain more recognition.

It is hoped, therefore, that some of the simple designs which will be shown here tonight, in comparison with some complicated designs, will be so much the more appreciated.

SAFEGUARDING GENERATORS AND TRANSFORMERS

There is very little to be said in regard to safety features on high tension apparatus, such as generators, transformers, etc. The necessary safety features on large generators are generally taken care of by manufacturers as a matter of course. The only thing that may be mentioned with reference to generators is that the air ducts should be laid out in such a way as to avoid fire hazards. "Ventilation but no draft" is not only a good sanitary rule, but holds equally well for all indoor high tension rooms.

Transformers have not been in the habit of late of blowing up. One very seldom hears of transformer explosions and the fear which people generally still have of high tension transformers is mostly based on mythical causes and therefore highly exaggerated. Live parts of large transformers are always out of reach and cannot possibly cause any hazard. Some authorities require a sewer connection with quickly operating valve from each transformer. This would be a wise precaution if an operator could be found who would be willing to go and operate this valve, when a fire occurs inside of a transformer.

The old style thermometers, which used to be on top of the transformer casing and were the cause of hazards to operators who had to climb ladders in order to read temperatures, have been eliminated, and dial type thermometers, mounted so that they can be read from the ground, are now in general use. In spite of the fact that there are still some engineers who are of the opinion that transformers should be housed, it may be said, without fear of contradiction, that the majority of experienced engineers will not even consider the placing of transformers inside of buildings; it may be considered evidence of this preference that practically all transformers now manufactured by all manufacturers are of the outdoor type, even when they are housed. There is no longer any argument whatever for placing transformers inside of buildings. To my mind the future type of large transformer substation will consist principally of an underground concrete tank for each phase, located at a considerable distance from the power house and containing in the same oil the transformer, high tension oil switch, low tension oil switch, current transformers and potential transformers, thus saving something like 12 high tension bushings, per circuit, which mean 12 sources of trouble.

LIGHTNING ARRESTERS AND BUS STRUCTURES

High tension lighting arresters should always be surrounded with wire mesh fencing, and all arresters which have charging mechanisms or transfer device mechanisms should have those mechanisms on the outside of the fence so that they can be operated without any possibility of an operator accidentally coming in contact with a tank, which, of course, is energized during the period of charging.

From the mere point of view of safety it is no doubt preferable to use one of the newer types of arresters which require no charging, such as the oxide film arrester or the Bennett-Surge arrester.

Bus structures in power houses should be simple, and, if possible, the oil circuit breakers, buses and disconnecting switches should be absolutely separated from each other by means of barriers containing no holes whatever. I can see no reason for designing a bus structure at all if half of it is left out by all kinds

of openings, which are required by unnecessarily complicated layouts. It is always possible by proper designing to make a bus structure simple. The introduction of mechanically operated disconnecting switches as against the hook switches commonly used, will eliminate a great deal of danger without making the design of the structure any more complicated. It should be the aim of safety engineers to eliminate hook switches altogether, since they have always been a source of trouble to operators and to property. Unfortunately, there are not many types of mechanically operated disconnecting switches on the market as yet which may be called satisfactory designs, but with an increased demand for this type of disconnecting switches, there is no doubt that new designs will be brought out which will be more suitable for the purpose than those on the market at present.

In some cases where hook disconnecting switches were found to cause trouble it was attempted to remedy it by interlocking the doors of the disconnecting switch compartments with the oil switch mechanisms so that the doors could not be opened unless the oil switch was open. This, however, was found to give additional trouble since, in some cases, the mechanisms, which are bound to be very complicated, did not function properly and it was necessary to break the doors when the disconnecting switches had to be opened quickly in order to clear a circuit.

In cases where great rupturing capacities are not required, truck type switchboards are to be highly recommended. This type of switchboard has been developed for voltages up to 15,000. It is compact, requiring very little space, and absolutely safe, but still somewhat too expensive. When truck switchboards become more popular they will, no doubt, also become cheaper.

C. D. GRAY'S IMPROVEMENTS IN SAFETY DEVICES

A great many simple refinements on safety features have been worked up under the leadership of C. D. Gray, chief electrician, The J. G. White Engineering Corporation. It would be impossible to enumerate even the most important portion of them in the course of an evening. I merely wish to mention a few of them at random. In the majority of power houses, the trip coils of all oil circuit breakers are generally in series with the one bell alarm relay when tripping. If this one bell alarm relay should happen to be out of commission, none of the oil circuit breakers in the station would trip under overload or short circuit, and thus a great deal of damage might happen. In order to eliminate this danger some up-to-date stations are using little tripping relays in each circuit, thus making the tripping circuit for each oil circuit breaker independent.

NEED OF SIGNAL LAMPS

Signal lamps should be installed on all high tension apparatus, such as transformers, oil switches, regulators, etc., to indicate whether or not they are alive. When using signal lights, the principle should not be lost sight of that one lamp is not sufficient for indicating whether or not a circuit is alive, because it is possible for this one lamp to be burned out. Both red and green lamps must be used. The small additional expenditure involved in providing such red and green lamps will often mean the saving of a good many dollars and perhaps often a saving in human life. The following case may serve as an illustration:

A set of 44,000-volt current transformers was installed on one common foundation with an oil switch. The circuit ran as follows: from high tension bus to disconnecting switch to oil switch to current transformer and out to the line. It was necessary for an operator to repair the current transformer. He promptly opened the oil switch, thus killing the current transformers, went up on the foundation, repaired the current transformer without any trouble, but when attempting to descend, he accidentally reached over to that terminal of the oil switch which was connected to the disconnecting switch, and since he had forgotten to open the disconnecting switch, the terminal was alive and killed him. If red and green lamps had been installed on the oil switch, that operator would not have attempted to do any work

on any part of it with the red lamp on. In order to make it possible to use these red and green lamps, it is, of course, necessary to use mechanically operated disconnecting switches, since it is not possible to install auxiliary switches on hook disconnecting switches.

When using electrically operated oil circuit breakers, it would be possible for an operator at the switchboard to close an oil circuit breaker upon which somebody may be working and thus injure him. In order to avoid this possibility, we are now using push button switches in the closing circuit of the oil switch. Such a push button switch is located near the oil switch, and, if a man wants to work on an oil switch, he opens this push button, thus disconnecting the control circuit and making it impossible for the operator to close the oil circuit breaker from the switchboard.

RIGID BUS OUTDOOR SUBSTATION

Returning to the subject of outdoor substations, there is very little radically new to be said about it. Its principles of design are the same as for any other station. There is no reason why there should be any radical difference in design between the outdoor and indoor substation. We originated the rigid bus outdoor substation as against the strain insulator bus outdoor substation quite a few years ago, and have found no cause as yet to change our ideas about it. There is no doubt that the rigid bus station is the simplest, cheapest and the *safest*. It is surprising that in spite of all that has been written on the subject, the old type substation consisting of four heavy steel towers, one in each corner, with bridges between them and every connection spanned between these bridges, is still being built. This is again a good example to illustrate the fact that the simplest design of substation is not the easiest design, but the most difficult. This statement cannot be repeated too often, because even a good many engineers have an entirely wrong opinion on the subject. In general, it may be said that *the design of an outdoor substation is determined by its disconnecting switches*. Even though this may sound somewhat paradoxical, it is nevertheless true and can be proved in each individual case. After the type of disconnecting switch has been decided upon, the design of the substation is practically completed. It may be emphasized again that the use of hook switches on high tension work, especially outdoors, should be prohibited and only mechanically operated disconnecting switches should be used. It can be proved in most cases that the extra cost involved in the introduction of mechanically operated disconnecting switches will be more than offset by the elimination of unnecessarily heavy steelwork and foundations.

ILLUMINATION OF STATIONS

All high tension stations should be properly illuminated, and the best and easiest way to illuminate a high tension station, especially when poletop apparatus are used, is by means of flood light. There may, however, be some cases where it would be necessary to install fixtures in addition to the flood light, as for instance, where transformers are arranged in two rows, in which case it would be very difficult to illuminate the aisle between the two rows of transformers by means of flood light.

THE SIMPLEST ARRANGEMENT OF STATIONS IS ALSO

THE SAFEST ARRANGEMENT

—*M. M. Samuels*

The Common Cup and Towel

By John J. Dooley

Industrial Sanitary Inspector, Bureau of Public Health Education, New York City Department of Health

THE danger that lurks in the common drinking cup and common towel has been heralded many, many times; yet few people give the matter serious enough attention, and many let the warning go unheeded.

Water comprises about two-thirds of the weight of the human body. Cool drinking regulates the temperature, assists digestion and eliminates poisons from the system.

Physicians contend that about eight glasses of water should be taken every day to maintain the body in a normal, healthy condition. Much more is needed in hot weather, so then we must drink water if we would be healthy.

The New York City Department of Health through its Bureau of Health Education, Division of Industrial Hygiene, is endeavoring not to use the law, but to preach health just as the disciples of old preached the gospel of religion. All public health laws are based on the common sense of health and hygiene, and 75 per cent of the people can be reached through common sense education.

DANGERS OF COMMUNICABLE DISEASE

Numerous diseases can be contracted through the common drinking cup; some of them are pyorrhœa, influenza, pneumonia, consumption, syphilis and other venereal diseases. The war has taught us much in this respect.

During the recent epidemic of influenza, if the common drinking cup and towel had not been so extensively in use, that dread disease would not have had so many victims.

The use of the common towel leads to eczema, carbuncles, boils, conjunctival trachoma and blindness from venereal diseases.

Typhoid fever, dysentery, tuberculosis, etc., are often traced to dirty hands; therefore, every one should be especially careful to wash his hands after attending to nature's needs. In the case of workers, if towels are not provided by the employer, every worker should furnish one himself, if not for his own sake, for that of his co-workers.

NEW YORK OFFICES VIOLATE CODE

In many offices, stores, factories and public places in the City of New York, either the common drinking cup or the common towel, or both, are used by intelligent people, although it is in violation of the law. Rule 155 of the Labor Law, Industrial Code, and Section 214, Sanitary Code, both prohibit the use of the common towel. Rule 165, Labor Law, and Section 144, Sanitary Code, both prohibit the use of the common cup.

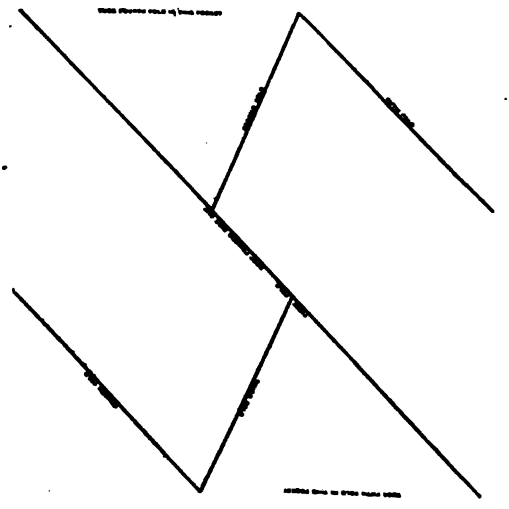

Fig. 1—Hygienic Drinking Cup Pattern

In a survey of office buildings in the downtown section of Manhattan, making forty visits in offices employing from two to fifty clerks and stenographers, we found in thirty-nine either the common towel or cup, or both. In a prominent office building in lower Broadway, employing over nine hundred men and

women in a clerical capacity, we found the roller towel in every washroom.

On a visit to a factory in the same neighborhood, where loose-leaf devices were being manufactured, we found twenty-three men and ten women, all foreigners. Twenty-one of the men each had his own cup or glass, and all ten of the women. It would thus seem that educated people are more careless in these matters than the less educated.

CARELESSNESS OF EMPLOYES

Where some employers have supplied individual towels and cups, and asked each employe to keep them in his or her desk or locker for private use, the cup is often negligently left at the water bottle, and the towel at the wash basin for hours at a time. Would the same people leave their handkerchief for the use of others? No. Well, as far as personal hygiene is concerned, the cup and towel are of the same importance as the handkerchief, and when the employer is so considerate as to supply spring water, he should not have to insist on the individual cup, but each should take precaution to provide this personal necessity.

The law cannot compel an employer to furnish individual cups and towels. All it can do is to have the employer remove a common cup or towel. This ends his part.

The purpose of this article is not to talk law, however, but health. The Department urges upon industrial employers and employes that each one look into this very common thing in a great city of over 6,000,000 people. We are sure that if each one does his or her part this menace will be eliminated without any such thing as law.

A drawing herewith (very much reduced in size) of a paper cup will show everyone how simple it is to have a private drinking cup. To make a cup, the lines shown in Fig. 1 should be drawn on a sheet of substantial linen paper, exactly 7½ inches square, and then folded in the order indicated.

Hand or Bench Tool Accidents

STATISTICS compiled by the British Industrial "Safety First" Association show that the number of accidents caused by hand and bench tools are increasing, and that they contribute a large portion of the accident toll demanded by industry. It is usually considered that danger is especially associated with power-driven machinery, but an alarming proportion of accidents occur in the use of hand tools. The progressive machinery manufacturer has succeeded to a great extent in the elimination of hazards by the installation of guards.

The question of safeguarding hand tools is more complex. In themselves, they appear to be harmless, and evidently lack of care is exercised in their use.

It is noticeable that tools provided by workmen themselves, as in the case of carpenters, are in a better condition than tools provided by the employer.

One large company, well known for its interest in the condition of the workers, in its "Regulations" issued to employes, states, "Wasting the Company's money by improper care and use of tools is an injury to the Company's ability to continue its liberal treatment of employes."

The proper use of tools depends upon very simple principles:

1. Be careful of the tools you work with while using them, and when finished with your job place them away carefully.
2. See that all your cutting tools are sharp.
3. Never use defective, "mushroomed" or burred tools yourself, nor work beside a man who does.
4. Do not use tools for purposes for which they were not intended.
5. Report all cases of faulty tools or material to the proper authority—your foreman.

Compliance with these rules may save a limb or even a life.

Editorial

SAFE-AGAINST-FIRE PRACTICES

SUNDAY, October 9, will be the fiftieth anniversary of the Chicago fire. In recent years the date has come into general observance as Fire and Accident Prevention Day. It is now the great day, every year, in the national movement for safety.

Public attention is being directed to a common observance of fire perils and accident-dangers not in any sense as a memorial to the past, but as a means of uniting community sentiment in a constructive effort toward a safer future.

The National Board of Fire Underwriters, the National Safety Council, Chambers of Commerce, Rotary Clubs and civic organizations of other kinds and titles are interested in spreading the information that we have an annual per capita fire loss ten times as large as that of Europe, that we can not afford to continue this extravagant waste, and how we can reduce if not prevent it altogether.

When a Fire and Accident Prevention Week program is thoroughly successful in awakening its community to the importance and feasibility of preventive measures, that community will observe the week for all of the other fifty-one weeks in the year.

In every town where the Safe-Against-Fire principle is not accepted in practice as well as in theory (and to see whether your town does practice it or not, count up its fire loss last year) fire prevention observances should have the interest of the Mayor, the Board of Education, the Chamber of Commerce, all the town industrial organizations, all the clubs, the Boy Scouts, the Camp Fire Girls, the newspapers and all the local merchants. The per capita fire loss can be applied very readily to comparisons that will help your town visualize its standing either as a public safety outpost or as a danger to the surrounding territory.

Use a slogan against flammable construction. Even without an exhibit and speeches, such a line as "Fight Fire When You Build—Not After," or "Your Fire-Dangers Are Not Your Private Affair" can do a great deal in winning for the fire-prevention idea the constant and general attention that it must have to reduce our present yearly waste of $300,000,000, besides the average of 18,000 lives lost and 60,000 persons injured.

Invent a 1921 slogan, and get your town to take notice.

WHEN PREACHERS DO NOT PRACTICE

AT a picnic on the tempting shores of Lake Michigan one of the picnickers went swimming and had cramps.

It is a common enough incident, and one which every Boy Scout troop is competent to handle. What to do? Why, administer first-aid promptly, of course. Any of the other picnickers could probably qualify, so let it be the nearest, and no delay.

The man with cramps was safely brought to shore. So far, his life had been saved; but not completely, for he needed prompt resuscitating measures, lest he give up the breath which had been torn from the treacherous waves. But lo, not a single person present knew how to administer first-aid!

A shocking admission? An exception-

ally uninformed picnic crowd? Where could they have come from, not to have learned and practiced first-aid from their school-days up?

Strange as it appears, the picnicking persons who seemed at first such ignoramuses, to the surprise of all who read as they run, proved to be, when identified, the office force of the National Safety Council. They have probably the latest information on safety work in other cities at their tongues' ends. They undoubtedly know what other people in Chicago and the remainder of the United States are doing to observe the canon of safety-first. They presumably daily hand out advice about how to organize first-aid courses in factories, stores, schools, and women's clubs. But they live so close to the water that they never expect to fall in.

This characteristic may be more common among the safety professions and their attachés than one would suspect. Elementary knowledge of one's professional subject is so much a matter of presupposition that perhaps even one's self may fall into presupposing it.

How about some entries from the various safety organizations at the St. Louis International First Aid and Mine Rescue Contest?

SAFETY SPECIFICATIONS IN STATE LAW OR CODE

THERE is an impressive variety in the subjects selected by the various State legislatures for regulation by statute or by code as to safety equipment and practice. As shown by G. E. Sanford's table in the August issue of SAFETY ENGINEERING, there are only two points of regulation on which as many as one-half of the States agree to provide any form of specification. These two are exits, regulated in 34 States, and power transmission, regulated by 26. Next in the order of their popularity among regulators come abrasives and buffing, electricity, floor openings, elevators, boilers, and construction, which are all that are regulated in as many as ten States.

Nine States regulate lighting, seven woodworking and textile industries, and six building strength. Foundries, compressed air, cranes, ventilation, and steam engines are each the subject of legislation or codification in five States. The hazards regulated in from two to four States are fire alarms, explosives, paints, laundry machinery, power control, machine and hand tools, food products, ladders, window cleaning, gas, quarries, chemicals, paper and pulp industries, and dredges.

The climax of this diversity in regulation is perhaps most clearly thrown into relief in the five hazardous occupations and locations which have received regulatory attention from only a single State apiece: refrigerating machinery, which has statute law regulation in Massachusetts; ceramics and steel, each the subject of a special industrial code in Ohio; logging, with code regulations in California; and yards, provided with a code in Pennsylvania.

It is worthy of note that with 36 hazards considered sufficiently menacing to invite and receive official regulatory attention in from one to 34 States, there are still four States, Arkansas, Florida, New Mexico and South Carolina, which find nothing to regulate. In contrast to these stand the leading industrial and other progressive States with many hazards under State supervision: Pennsylvania leads with 25, followed by New York with 21, New Jersey with 20, California with 19, Wisconsin with 18, Massachusetts with 16, Ohio with 12, and Oklahoma with 10.

The States regulating from two to nine hazards are Michigan, Illinois, Oregon, Utah, Connecticut, Indiana, Missouri, Colorado, Iowa, New Hampshire, Washington, Kansas, Maryland, Ne-

braska, Virginia, Idaho, Kentucky, Louisiana, Maine, Rhode Island, Tennessee, and Vermont. There are 14 States which regulate only one hazard of the 36 tabulated by Mr. Sanford. The lowest common denominator seems to be the matter of exits, which receives the lone regulatory effort of nine of these 14 single-regulation States, besides being included among the regulated risks of 25 other States. Electricity gets three of the votes of the single-regulation States, besides 15 others, while Minnesota and Mississippi make their sole respective regulations on boilers and power transmission, both by statute.

The 44 States which have found regulations necessary have placed 270 of them on the 36 hazards included in Mr. Sanford's data, an average of over six regulations per State, if we do not take into the account the no-regulation States, Arkansas, Florida, New Mexico and South Carolina.

The gain of the code form of regulation over the statute is notable, especially in view of the recent date of the innovation. There are already 158 code-regulated hazards, and only 112 controlled by statute. Two States whose regulations are more inclusive than the average use only code regulation; these States are Utah and Wisconsin. Arizona also has used only this form, but is limited to one utility code, for electricity. There are 20 States which have not taken any other means than the enactment of statute law to control their public utility and industrial risks; this number, however, included all but two of the 14 States which have made only one safety regulation.

The figures in Mr. Sanford's table furnish a basis for a more exhaustive analysis of the precautions taken by the States to enforce safe conditions. While no conclusions can be final from this brief consideration, it seems a hopeful tendency that the industrial States and those in which some one special industry is predominant are formulating codes to regulate the risks common to many of their citizens.

ACCIDENTS THE CAUSE OF STAGGERING ECONOMIC WASTE IN THE BUILDING INDUSTRY

THE investigation of the building industry made under the direction of the Committee on Elimination of Waste in Industry of the American Engineering Council by Sanford E. Thompson of Boston and a large force of office workers recently reported that "enormous losses are suffered through accidents, the $30,000,000 paid yearly to insurance companies for compensation and liability insurance by no means representing the total lost. In the opinion of one of the best authorities in the country the actual cost of insurance represents not more than 25 per cent of the total economic loss, which brings the total cost due to accidents in the vicinity of $120,000,000 per year, a staggering total."

In Massachusetts during one year accidents caused a loss of time of 485,486 days. In New York State, where four times as many workers are employed in the factories as are employed in building and construction work, there were more fatalities due to accidents in building than in factories during a 4-year period.

These accidents are largely caused by lack of ordinary safeguards. Conditions which would not be tolerated in a factory for 24 hours are found on every job, it is asserted. Men often quit because of the risk involved.

Great savings are possible, the report says. "An official of a large insurance company believes that by proper safety measures the waste due to accidents can be reduced 75 to 80 per cent in from 2 to 5 years of honest effort, and that construction labor cost can be cut 3 per cent by these measures. Another official estimates, from actual accomplishment in safety measures, that a total of more than 12,000,000 days a year could be saved the industry by the application of safety methods."

Safety News and Comment

No Exhibit at Boston Congress

OWING to the small number of entries of manufacturers of safety devices and equipment, it has been announced that the Tenth Annual Safety Congress, to be held in Boston September 26-30, will not have the commercial exhibit which has become a customary auxiliary feature.

Fire Marshals Convene

SEPTEMBER 22, 23, and 24 the Fire Marshals' Association of North America will hold its sixteenth annual convention at Chattanooga, Tenn. The program includes addresses by Insurance Commissioner G. Waldon Smith of Maine, Deputy Insurance Commissioner F. G. Lindsey of Little Rock, Ark., Gordon Ferguson of Toronto, Canada, T. Alfred Fleming, Supervisor of the Conservation Department, National Board of Fire Underwriters, and Fire Marshal George H. Nettleton of Minnesota.

I. A. F. E. to Meet in Atlanta

THE International Association of Fire Engineers will hold its annual meeting in Atlanta, Ga., October 11, 12, 13 and 14. The topics to be considered were selected at the 1920 meeting in Toronto and sent to members so that suggestions and criticisms could be prepared. Besides the general subject of fire prevention these topics include the following: Fire Department Engineering, Building Inspection by Members of the Fire Department, Water Supply and High Pressure Systems, and Salvage.

R. F. P. A. to Meet in Chicago

OCTOBER 18-20 are the dates and Chicago the place for the 1921 convention of the Railway Fire Protective Association. The meetings will be held in the Hotel Sherman.

Papers will be read by Harry Pollard of the Southern Pacific Railroad on "Fire Protection and Fire Prevention in Tunnels"; by L. F. Wilcox, of John C. Paige & Company of Boston, on "Fire Protection on Foreign Railroads," and by O. B. Heppner, of the St. Louis & San Francisco Railway.

Committees will report on fire prevention and protection of shop plants; statistics; locomotive hazards; telephone and telegraph hazards and protection; coaling plants; storage and handling of gasoline; and electric motor trucks in freight depots and terminals.

Building Construction Handbook

A SECOND edition, much enlarged, of "Safety in Building Construction" has been issued by the Travelers Insurance Company. The new edition pays particular attention to the use of oxy-acetylene equipment in the demolition of steel-framed buildings. Other subjects treated include hoisting, scaffolds, and mixing and pouring concrete (an entirely new section).

Bullard Firm Continues

ALTHOUGH the partnership of the San Francisco firm of E. D. Bullard was sharply terminated by the sudden accidental death of the senior partner, Edward D. Bullard, on July 15, 1921, the business will be continued under the same firm name by the surviving partner, E. W. Bullard.

Mr. Bullard was able to rescind the cancelation of his Eastern trip, previously announced in SAFETY ENGINEERING, and acted as one of the judges of the International First Aid and Mine Rescue Contest held in St. Louis September 1-3. He also visited New York and other eastern cities in the interest of the firm.

Engineers' Employment Bureau

THE wide and varied field of engineering activity has created the need of some great clearing house of engineering services from which engineers of any specific qualifications may be obtained.

In recognition of this want, the Federated American Engineering Societies, representing a combined membership of about 50,000, including the best and most representative professional engineers in the United States, has established at 29 West 39th Street, New York, an employment bureau for engineers of every variety of training and experience.

Applicants must be members and submit a complete educational and professional record which is carefully classified, so that as the special requirements of any position are received, the records of men of suitable qualifications may be submitted for consideration. The relatively large number of men with whom the bureau is in touch, the comprehensive classification of records, and the fact that the services of the bureau are free to employer and member alike, renders possible the selection of the right man for the service required. Negotiations may be confidential if desired.

The high standards required for membership in any of the member societies insure the quality of men available and the bureau will welcome inquiries from those seeking to build up or expand their engineering organizations in preparation for the increased activity now manifest.

Holmes Safety Association

THE Bureau of Mines is sponsor for a plan to expand the Joseph A. Holmes Safety Association, named six years ago in honor of the first director of the Bureau. The organization hopes to enroll the 50,000 miners who have received the training of the Bureau of Mines courses in first-aid and mine-rescue work in local chapters of the parent society. Some of the local chapters may be joined by the numerous unattached safety groups in mining communities.

Joseph Austin Holmes, president of the association, presented the medals awarded for heroism at the St. Louis International First Aid and Mine Rescue Contest September 1-3.

Princeton Engineering Expansion

PROFESSOR Arthur M. Greene, Jr., of the Department of Mechanical Engineering, Rensselaer Polytechnic Institute, has been appointed dean of the School of Engineering of Princeton University, and plans for the extension of engineering work have been endorsed by the Princeton University trustees. Professor Greene will assume his new office at the beginning of the college year 1922-23.

Professor Greene is an authority on heating and ventilating. He is at present chairman of the American Society of Mechanical Engineers' Special Committee on Steam Piping, as well as chairman of the Society's Research Committee, member of its Boiler Code Committee, and its representative in the Engineering Division, National Research Council, and on the Executive Board, Federated American Engineering Societies. During the war he was a member of the Naval Consulting Board's Advisory Committee of Technical Societies and of the Engineering Council, United Engineering Societies, besides engaging in city and county organized war service. He is the author of *Elements of Heating and Ventilation, Heat Engineering, Pumping Machinery,* and *Elements of Refrigeration.*

The policy of the Princeton School of Engineering will doubtless be shaped in accordance with the belief of the new Dean that "all engineers should be acquainted with the various methods of protecting workmen from injury, as well as protecting the public. Safety engineering applies to the work of all engineers who have to deal with constructive work where men are employed." The major portion of professional study of safety methods, Professor Greene holds, should come after the completion of theoretical subjects, and can be well handled in

courses dealing with shop management and the handling of men. He has a high regard for such "unconscious training" of the engineering student as can be provided by the display on bulletin boards in engineering buildings of illustrations of safety devices and safety-first warnings.

Aircraft Register Staff

UNDERWRITERS' Laboratories has secured for classification work on its Aircraft Register, begun at the request of the National Aircraft Underwriters' Association, the services of Major R. W. Schroeder, formerly of the United States Air Service and Chief Test Pilot of McCook Field, Dayton, O., Major Schroeder is the holder of the world's altitude record, 33,114 feet. His experience fulfills the object of the Laboratories "to secure the best and fairest opinion regarding the merits or demerits of every device, system, machine or material in respect to life and fire hazards."

In addition to Major Schroeder, the aircraft personnel of the Laboratories' staff includes S. V. James, mechanical engineer, for several years chief designer in an extended airplane experimental research work; C. R. d'Olive, superintendent of label service, formerly first lieutenant, 93d Pursuit Squadron, A. E. F., and holder of a D. S. C.; K. G. Leigh, assistant engineer, formerly second lieutenant, pilot and instructor, United States Air Service, and E. L. Barrett, assistant engineer, formerly instructor, aviation motor school, United States Navy.

Oregon Compensation Law

ON July 1 the Oregon State workmen's compensation law became effective. The new law makes a 5 per cent reduction on a plant's total industrial accident insurance cost for the compliance of the plant with five prescribed safety standards. "Three of these pertain to organization and two to education. The organizational provisions are the formation of a safety committee of at least three persons; monthly meetings of this committee to act generally on all matters for safeguarding life and limb; and the forwarding of the minutes of these deliberations to the state industrial accident commission as proof of compliance. The educational provisions are maintaining a bulletin board at the plant to post all safety bulletins and receive suggestions for better safety administration, and talks by foremen or others qualified to advise relative to safety plans."

Sanitation Exhibition in Chicago

A HEALTH and Sanitation Exhibition was one of the non-commercial displays of the Chicago Industrial and Educational Exposition held on the spectacular Municipal Pier July 30-August 14.

Public safety was one of the ideas advanced by this event, and both fire-fighting and industrial accident reduction methods were shown.

Firemen's Masks Needed

ONE fireman was killed and 8 others overcome by smoke and gas while fighting a cellar-fire in a tenement building at 1158 First avenue, New York City, Sunday, July 31, although the New York *Times* reported the fire as a "smoldering blaze which did trifling damage."

The fireman who died was Joseph Flanigan, a veteran of the World War, who had received a service medal. An ambulance surgeon from Flower Hospital tried in vain to revive him.

It is in such minor fires as this that the greatest danger of suffocation often occurs. If the escaping gas had been met with proper masks this fireman's life should have been saved and the fire extinguished without sending off two ambulance-loads of firemen overcome to be resuscitated in a hospital.

Compressed Air in Mines Ineffective

FROM a study of temperature and humidity data at 36 working places in 11 mines, including gold, silver, copper, lead, and zinc mining in 4 states, at

horizons ranging from 500 to 4,900 ft. below the surface, D. Harrington, Supervising Mining Engineer for the United States Bureau of Mines, concludes that under the present practices the use of compressed-air blowers for ventilation is ineffective. Its only actual benefits are the limited amount of comfort due to movement of air, and the supplying of a comparatively small amount of fresh air at the faces, according to Mr. Harrington, in Bureau of Mines "Reports of Investigations," May, 1921 (Serial No. 2246).

"Blowers were found in use in cool mines (below 75° F.) only rarely, and then to remove fumes from explosives, for which purpose the compressed-air blower, while very widely used, is very inefficient and costly and at times dangerous. In hot or moderately hot mines (with air above 75°F.), compressed air is in use very freely at about three out of every four working faces, and where there are 100 or more working faces this throws a heavy burden on the compressed-air plant. Each blower throws as great a burden on the air compressor as would three to four drills. Moreover, where many blowers are in use, the delivery per blower is variable and even if the compressor capacity is great, there will very frequently be low compressed-air pressure at faces and machines must work at low efficiency if they work at all.

"By employing ordinary methods of coal-mine ventilation with surface mechanical fans, with ready means for reversing currents, supplemented by properly placed underground doors, brattices, regulators, etc., and with air currents divided into suitable splits, the main workings and frequently even blind ends can be supplied with fresh, cool air in quantities of several thousand cubic feet per minute, instead of a few hundred feet by compressed-air blowers. For blind ends inaccessible to ordinary methods of air circulation, small fan units connected to canvas or galvanized tubing will readily supply one thousand or more cubic feet of fresh moving air per minute to workers, efficiently relieving unfavorable heat and humidity conditions, and effectively removing fumes from explosives in five to fifteen minutes after shooting instead of *partly* removing them in an hour to two or three hours by compressed air. The cost of circulating any fixed quantity of air underground by ordinary means (fans, etc.) is little, if any, more than one one-hundredth that of supplying the same quantity of compressed air; hence ten times the quantity of circulating air that can be provided by compressed-air system can be supplied by fans and the cost still be only one-tenth that of supplying the smaller quantity of compressed air. The compressed-air open-hose blower is costly; it is inefficient with regard to removing fumes, remedying heat or humidity conditions, or giving comfort by inducing adequate movement of air, and it is actually unhealthful in most mines due to the fact that only too frequently the workers direct the compressed-air stream in such manner across muck piles, cars being loaded, etc., that the worker is caused to breathe excessive quantities of the fine siliceous or other dangerous dust so often found at blind ends in our metal mines."

The author of this report has written a paper on "Ventilation in Metal Mines," for the Cleveland meeting of the American Society of Heating and Ventilating Engineers, June 14-17, 1921.

Accident Insurance Costs

M. R. LOTT of the Sperry Gyroscope Company, writing for *Factory*, describes how the firm of which he is personnel superintendent reduced its expenses for compensation insurance 67 per cent. The experience of this company was in favor of stock company insurance for "excess hazard insurance" to cover costs exceeding $5,000 for any one accident, and all other costs to be carried as self-insurance. This, of course, would apply only in States where self-insurance is permitted, and would be profitable as a rule only for plants maintaining "an adequate

safety organization and hospital facilities." It is recommended as a plan that reduces absenteeism as well as accidents. Mr. Lott argues for a careful consideration by employers of the humanitarian side as well as the financial, in deciding on the type of compensation insurance to be carried.

Safety Gasoline Washstand

ENGINEERS of the Springfield factory of the American Bosch Magneto Company have worked out a safety stand for washing articles in gasoline, described by C. A. Mayer in *Factory*. Accidents since the device has been installed are said to be practically negligible, and credits have been obtained so as to reduce insurance rates.

"This stand is essentially built up of angle iron with a sand box on top and a compartment for gasoline and kerosene cans at the bottom. The working space is in the center, about the same height as the average work bench from the floor up.

"The upper compartment is filled with sand, which is held arrested by two trap-doors supported by a lever on each side immediately underneath the trap doors.

"The long ends of the levers are connected with a string of gun cotton. Should the gasoline become ignited through some accident, the gun cotton string will immediately burn through, thus releasing the two levers and opening both trap-doors, releasing the sand and smothering the flame. At the same time the sliding door in front will move upward, confining the flames inside of the compartment."

False Fire Alarms in Factories

OVER the signature of Phillip J. Harty, Fire Chief of the Youngstown Sheet and Tube Company, in the company's *Bulletin* for August 15, 1921, appears an account of a false fire alarm sent in over the plant Gamewell system, "for a joke." Chief Harty says:

A false alarm in the plant is really a greater crime than in the city, for it may summon the volunteer from the lofty heights of the crane runway, where he may be engaged upon a repair job, and causes him to take chances in scurrying around hazardous places in order to reach his destination and leaves his mind filled with but one thought—*fire*.

Fire equipment or apparatus should be treated with as much respect, if not more, than dynamite, electricity or even gasoline. There is no telling the impediment one is placing to the extinguishing of a fire or the saving of a life by removing the contents of an extinguisher or pulling a false alarm.

A forcible argument, even a club, should be used to good effect on the idiot who sends the firemen and apparatus on a wild goose chase at the moment their services may be needed somewhere else.

In case you observe anyone with an inclination to pull a false alarm, call a few of the above facts to his attention and if talking is not effective, bring him to the fire station for further instruction.

Applicants Must Boost Safety

THE Utica Mutual Insurance Company has prepared for the use of industrial plants a safety poster addressed to applicants for employment which reads: "Notice to all men seeking employment—If you are unwilling to think 'safety,' work 'safely,' and boost for 'safety' you should not ask for employment here."

Cleaning and Dyeing Regulations

THE Minnesota legislature has recently passed a law modeled on the Ohio statute to regulate the construction and operation of dyeing and dry cleaning establishments.

The law as passed unfortunately fails to provide an effective method of enforcement. As the bill was originally introduced, a fee of $25 was to go to the Fire Marshal Department, which was charged with enforcement of the law. The law was amended before it was passed so that this $25 fee goes into the general funds of the State. This has the result of placing responsibility for the enforcement of the law upon the State Fire Marshal Department without giving it any extra funds for performance. The personnel of the department is already overburdened, so that it will be difficult to enforce the new law rigidly.

Garage Floor Hazard

PLANK floors in garages are a constant fire hazard, and to be avoided in new garage construction. For old floors already oil-soaked a safety measure is suggested by the *Spectator*. The principle of the corrective treatment is to saponify the oil in the boards so that it can be removed from the pores of the wood. This is accomplished by scrubbing the flooor with a strong solution of lye, the solution having been thoroughly cooled before being applied to the wood. In this way the oil is combined chemically with the lye so as to form soap, which can be flushed away by a stream from a hose-line.

Outside-the Plant Inspections

POTENTIAL causes of accidents that are often overlooked by insurance inspectors are the subject of an article in the August issue of the *General's Review*. Among the hazards that demand particular attention in the yards and approaches to the plant are said to be holes in the ground, stumps, loose boards and piles of material, both promiscuous and stock, foundations, racks, vibration, drainage, leaning weights, railroad trestles, sidings and clearance, switch frog guards, warning signs, enclosed runways and their lighting, slipping hazards such as sloping roofs and water-conductors discharging on or near a passageway, guy wire anchorages, and practices like crane-hook-riding.

Increases Urged for Prevention

A SPECIAL committee appointed by the Fire Prevention Committee of the Safety Council, Chicago Association of Commerce, to investigate into and report on the condition and needs of the Chicago Bureau of Fire Prevention and Public Safety has made its report, which is endorsed by the Executive Committee of the Association of Commerce. The recommendations of the committee are that the force of 35 inspectors be increased to 50, with four junior fire prevention engineers to direct their activities, and a necessary increase in office force, and that fees for inspections be increased in accordance with the suggestions of Chief McDonnell.

Colored Lights Standardized

ENDORSEMENTS to date of the recommendations of the Committee on Standards of the American Association of State Highway Officials, that red, yellow, and green be used in road traffic to indicate, respectively, "All traffic stop," "Proceed with caution," and "Road intersection dangers," now include over 200 cities and the following other national associations:

American Automobile Association, American Electric Railway Association, American Railroad Association, Automobile Club of Southern California, California State Automobile Association, Council of National Defense, Federal Highway Council, International Association of Chiefs of Police, Motor and Accessory Manufacturers' Association, National Association of Automotive Mutual Insurance Companies, National Association of Brotherhoods of Threshermen, National Automobile Chamber of Commerce, National Automobile Dealers' Association, National Automobile Underwriters' Conference, National Highway Traffic Association, National Implement and Vehicle Association, National Safety Council, National Workmen's Compensation Service Bureau, Rubber Association of America, Tractor and Thresher Department of the National Implement and Vehicle Association, and The Trailer Manufacturers' Association of America.

Fire Protection Survey

RECENT city fire prevention and fire-fighting equipment reports by the Fire Prevention and Engineering Standards Committee of the National Board of Fire Underwriters include a full replacement report on Canton, O., a special supplementary report on conditions in the fire department and fire alarm system and improvements in the water supply of Louisville, Ky., an initial full report on Mansfield, O., a special supplementary report on improvements in the fire-fighting facilities in Peoria, Ill., and full replacement reports on San Jose, Cal.; Savannah, Ga.; Springfield, Ill., and Stockton, Cal.

Compulsory Safety for Washington

THE State of Washington Safety Board became a part of the consolidated State Industrial Department under a new code plan of government on April 1, 1921.

The 1920 report of the board advocates making plant safety devices compulsory throughout the State, "upon the theory that compliance or non-compliance is certain to appear in the accident experience of an establishment. Awards and penalties should be based upon a rating system whereby each establishment would pay a rate based upon its accident cost experience, coupled with the visible and known hazards. This would make the safety act more effective."

Refrigerating Plant Regulations

THE Alberta Workmen's Compensation Board has put into operation, beginning July 1, protective regulations formulated in conference with refrigerating plant representatives for the protection of workers in such establishments. The provisions include the following, quoted from the Canadian *Labour Gazette:*

The regulations provide that a safety valve must be attached to all refrigerating machines to relieve the pressure when it reaches or exceeds 250 pounds; that another valve be attached to provide an escape for ammonia fumes in case of fire; that gas masks of a type approved by the Board be provided for workmen entering rooms in which ammonia is in use; and that employers must test their safety valves and other apparatus for the prevention of accidents at least once a year, and gas masks once a month, and submit to the Board a report of the tests in each case.

Mine Telephone Regulations

THE United States Bureau of Mines has issued a compilation of abstracts from the State safety rules and regulations of the 16 mining States which have telephone laws for safeguarding life and property at mines. Some States require installation in all underground mines. The abstracts, prepared by L. C. Ilsley, electrical engineer, and R. A. Kearns, electrical aid, appear in Bureau of Mines Reports of Investigations, No. 2258.

Marble Quarry Accidents

OUT of the 4,438 men reported to the United States Bureau of Mines as employed in marble quarries during 1920, 4 were killed and 400 injured by accidents during the year, 132 of the injuries occurring in and about the quarry pits, and 268 at the rock-dressing plants outside the quarries. In the pits 27 men were injured by handling rock, 22 by flying objects, 22 by drilling and channeling, 15 by machinery, 12 by falls of persons, and 11 by timber or hand tools. At the outside rock-dressing plants, 162 men were injured by handling rock, 30 by machinery, 16 by nails and splinters, 15 by haulage accidents, 13 by falls of persons, and 11 by flying objects. These accidents were incident to an average working year of 294 days.

Considered by States, 231 men were injured at quarries in Vermont, 29 in Tennessee, 26 in Georgia, and 24 in Missouri.

Ohio Fire Prevention Exhibit

H. A. DYKEMAN, Fire Marshal of Ohio, was responsible for a striking Fire Prevention Exhibit at the Ohio State Fair, held August 29-September 3 at Columbus. The exhibit brought to the attention of the 30,000 visitors the $14,000,000 property loss caused by Ohio fires last year, in addition to the loss of 388 lives, and included a display of fire-fighting equipment.

Marshal Dykeman was assisted by Lieutenant Glenn A. Beall and Battalion Chief John A. Welch of the Columbus Fire Department, and received the cooperation of the Firemen of Ohio, the National Board of Fire Underwriters, Underwriters Laboratories, the National Fire Protection Association, the Ohio Conservation and Fire Prevention Association, the Ohio Inspection Bureau, fire equipment manufacturers and others.

To Control the Tire Vulcanizer

"WE strongly recommend that every rubber tire vulcanizer be equipped with a safety-valve, a pressure-gauge, and a glass

water-gauge, and we emphasize the importance of seeing that these appliances are kept in perfect working order at all times." This from the Engineering and Inspection Division of The Travelers' Insurance Company and The Travelers' Indemnity Company.

Ten Days to Rebuild Lynn Bridge

THE August issue of SAFETY ENGINEERING told how the Saugus river boulevard bridge between Lynn and Revere, Mass., was burned on June 17, and had not been replaced to the date of going to press. We have since received an account of the rebuilding of that bridge in an actual construction period of ten days. This quick-time record was made by the Lynn Works of the General Electric Company, which offered to undertake the job as a temporary crossing to be built in fifteen days at cost, after the engineering department of the Boston Metropolitan District Commission had estimated that the structure would take from six months to a year to rebuild, at a cost of $60,000 to $150,000. The cost of the temporary construction, accepted after a series of conferences, was $35,000; the temporary bridge is guaranteed for ten years.

H. S. Baldwin, department engineer of the Lynn Works, was responsible for this engineering feat, both its conception and its execution.

City Has Safety Department

DECATUR, GEORGIA, which has the city manager plan of government, has inaugurated a city department of safety, combining the old police and fire departments, which under the new plan of operation become sections of the safety department.

Safety for Wood-Working Industries

R. J. WALDO, in *The Wood Worker*, says that the need for safety organization in the wook-working industries is great, (1) "because of waste pieces which are left upon machine tables or fall into the gearings easily, often causing a break in the machine, the broken pieces in many cases being thrown against the worker," and (2) on account of the frequent breaking of knives and cutters caused by the high rate of speed found in all wood-working plants.

Among safeguards which have been of value in woodworking shops, aside from good lighting and cleanliness, are belt guards or the individual motor to eliminate belts. Wire-netting guards and white-painted guards have both been found useful. Tight clothing for the workers saves some danger.

But in spite of all safeguards some accidents not due to carelessness will happen. Mr. Waldo says: "I have seen a shaper cutter, making approximately 4,500-r.p.m., break and go through the abdomen of an operator who was at all times careful in his work."

School Lessons in Safety

PETER A. MORTENSON, Superintendent of Schools in Chicago, has distributed to all Chicago public school teachers a pamphlet of "Safety Lessons to Save the Lives of Children during the Coming Summer," with a personal appeal asking them to devote a few minutes each day to "Safety First" instruction. This plan went into effect June 2, and covers the following subjects: Street Dangers—Automobile, Street Car, Horse Vehicle; Fire Dangers—Burns and Scalds; Drowning; Guns, Pistols, Knives and Sling-shots; Railroad Accidents; and Deaths from Falls and Falling Objects.

Electrical Symbols Standard

THE American Engineering Standards Committee has designated as joint sponsors for a sectional committee to formulate a standard set of symbols for the electrical equipment of buildings, the American Institute of Architects, the American Institute of Electrical Engineers, and the National Association of Electrical Contractors and Dealers. The following organizations have also been suggested for representation on the sec-

tional committee: Fire Protection Group of the American Engineering Standards Committee, Associated Bell Telephone Companies, United States Independent Telephone Association, American Electric Railway Association, Bureau of Standards, Bureau of Engineering, United States Navy, Society of Naval Architects and Marine Engineers, and such departments of the United States Army as are interested.

Unsafe Building Collapses

A BUILDING at 291-293 the Bowery, New York City, owned by the Methodist Episcopal Church and occupied by the Hadley Rescue Mission, collapsed on the morning of August 16, 1921. It was three stories high, and in a decrepit state of repair. No further cause for the accident has been found than the antiquated condition of the building, but that should be explanation enough to show the need of either repairs or demolition for old buildings put to public or semi-public purposes. "Scores of homeless men" are reported to have been sleeping in the basement of this structure at the time of the collapse, and escaped being buried under debris only by the chance that the joists supporting the first floor above them were stronger than the rest of the building.

Mine Rescue Station for Terre Haute?

REPRESENTATIVE Everett Sanders has prepared a bill for introduction in Congress to establish at Terre Haute, Ind., a mine rescue station. The proposed cost of the new station is $7,800, which would provide a modern station for the central west.

Pacific Coast Changes

THE San Francisco office of the Pawling & Harnischfeger Company, of Milwaukee, has been moved from the Monadnock Building to 32 Beale street. At this new address the company maintains a complete service station warehouse and display room for cranes and hoists, machine tools and excavating machinery. R. M. Taylor, district manager for the Pacific Coast, also has his headquarters now at the Beale street address. J. MacFerran Taylor is a new member of the Pacific Coast Sales District.

New York Harbor Oil Pollution

SAFETY ENGINEERING for June reported the efforts being made by the National Board of Fire Underwriters, in co-operation with many other public and insurance interests, to prevent the pollution of New York Harbor by the discharge of fuel oil into its waters. This danger is the subject of a circular letter issued to members of the Bureau of Surveys of the New York Board of Fire Underwriters under date of August 15, and the appeal of the Bureau has been widely quoted by newspapers and magazines addressed to the lay public.

The conditions, long admitted to be unsatisfactory, "would, furthermore, be materially worse than at present were it not for the fact that activity in shipping has been restricted during recent months. Notwithstanding this, the deposits of fuel oil about basins or bays, where it does not move freely with the tides, has steadily increased. The present extent of the deposits of fuel oil on the piles and bulkheads of piers in and near such basins about the harbor constitutes a dangerous condition, owing to the fact that a fire from any cause, if gaining headway beneath the pier, would be difficult to extinguish and likely to spread to other properties, producing a general conflagration.

The fire underwriters' document continues:

> The conflagration hazard is marked by heavy deposits of fuel oil on piles, bulkheads and other property on Beard's Erie and Atlantic Basins, Brooklyn, and on the Gowanus Canal and Newtown Creek.
>
> Present indications are that notwithstanding the relative inactivity in shipping during recent months, the condition of the piles and bulkheads of piers in bays and basins about the harbor is growing worse. It is freely admitted in shipping circles that the conditions are radically worse when shipping is active. It would, therefore, seem that the necessity of

some prompt and radical action to curb this growing conflagration hazard is urgent. Some provision should be made now before the return of normal activity in shipping.

The situation has now reached the point where the conflagration hazard is considered serious by this office, and this bulletin is intended to acquaint members with this fact. It is also hoped that members will interest themselves in the matter and co-operate with this Bureau in its attempt to secure the following remedies, which should be provided without further delay:

1. Ample facilities for prompt removal and proper disposition of oil or water containing oil, from ships while in port. Some adequate service should be promptly provided, preferably by the municipality or under the direction of an organization representing the shipping interests.

2. A radical increase should be made at once in the facilities for enforcing the provisions both of the federal and municipal laws prohibiting the discharge of oil on the waters of New York Harbor."

Captain D. C. Hanrahan, War Department Supervisor of the Port of New York, on August 23 appointed a committee of shipping men to study corrective methods for this hazard. In a letter to the Mayor, Commissioner Murray Hulbert of Docks and Ferries called attention to the danger shown in the destruction of the S. S. *Granite State*, described in a previous issue of SAFETY ENGINEERING, and said that this fire might have been even more disastrous if the ship had been near a large pier.

Watchmen's Jobs Dangerous

THE Bureau of Safety of the Utica Mutual Insurance Company has issued to the compensation policyholders of the company a bulletin warning of the liability to serious accidents of men of advanced age and of physical disability and impairment in the common employment of watchmen, elevator operators, and the like. In such positions, the men find themselves alone and by reason of their impairments and infirmities the more liable to accident.

"If circumstances necessitate the employment of such men, they should be assigned to non-hazardous work where immediate assistance is available in case of accident. Such an arrangement would be charitable to the employe and would tend to eliminate the excessive compensation cost that may result. Watchmen, especially, should be men of able body and a physical fitness that will permit them to withstand the occasional rigorous requirements of their positions."

British Anti-Anthrax Station

EAST Indian goat hair and Egyptian wool and hair are to be permitted as imports into the British Isles only when landed at a new experimental disinfecting station, recently completed at Liverpool, according to the Canadian *Labour Gazette*. The cost of upkeep of the disinfecting station is to be covered by a charge on the materials disinfected against anthrax. Other suspected commodities will be added to the list as soon as these are satisfactorily handled.

Coal Mine Fatalities Increase

THE coal mine fatality rate, in the United States, per million tons mined during the first half of 1921, was 10.46 per cent higher than for the same period in 1920, in spite of the fact that the actual number of fatalities decreased from 1,093 to 970. This apparent contradiction between increase and decrease in fatalities at the mines is involved by a decrease in production from 301 million tons to 242 million tons, or nearly 20 per cent.

The output of coal for each life lost in 1920 was 285,000 tons.

More Confusion in Flags

AFTER we had thought that the green flag had been so well propagandized that it would be recognized anywhere as the emblem of Safety, along come the Associated Press despatches from Calicut, India, saying calmly,—calmly, at least, from the Safety standpoint,—"The Moplah fanatics appear to be proclaiming home rule in all disturbed areas. *Their emblem, the green flag, has been hoisted at Pallipu.*"

Electrically Precipitated Dust Hazards

DR. FREDERICK G. COTTRELL developed his process for the electrical precipitation of dust in connection with smelter difficulties around San Francisco Bay, where fumes and vapors resulting from sulphuric acid parting processes were proving extremely disastrous to the farmers. The menace was so great that a closing down of the smelters through litigation seemed inevitable, and was only prevented by Dr. Cottrell's application of electric precipitation.

The precipitating process which Dr. Cottrell employed in the smelters can be also utilized, according to an article in *The Travelers Standard*, May, 1921, "for suppressing the dust in stone-crushing and cement works; for reducing the smoke from house and factory chimneys; for removing soot, tar, and other substances from illuminating, producer, or coke-oven gases; and for recovering finely-pulverized material such as lampblack. It can remove finely-divided liquid particles from gases, and is therefore useful in controlling acid fumes in chemical plants. In short, the system is applicable wherever finely-divided substances exist in a state of suspension. The electric precipitators are used, for example, in sintering machines; in copper and lead converters; in drying, roasting, and calcining kilns; in electric furnaces, in sulphuric acid concentrators; in nitrating operations; and in a host of other industrial processes.

"With good comes evil, however, and the Cottrell process has its drawbacks. The use of a 25,000- to 100,000-volt direct-current circuit, such as is necessary in the successful operation of the precipitators is attended by marked electrical hazards. The dangers that are commonly associated with the handling of high-tension electric lines in general are present wherever the Cottrell process is used, and corresponding precautions are necessary. The matter of insulating the electric conductors is extremely important, and under no circumstances should the charged parts of the apparatus be handled while the current is on. All exposed parts should be grounded, or effectively protected by grounded screens or other approved protective devices. Signs warning persons of the existing dangers should be posted in conspicuous places, and when the apparatus is in operation, signals of some kind should be used to indicate the fact that the current is on. The workmen should also be warned of the danger in getting near the high-tension lines. When removing the collected dust from the walls of the apparatus, the gas stream and the electric current should both be shut off.

"In addition to the electrical hazard, there may be a chance of arcing occurring inside the precipitators. With certain forms of combustible dust, an arc in the presence of the suspended matter might precipitate a serious dust explosion, although experience has indicated that the electric field usually reduces the dust content below the explosion limit. To lessen the chance of a dust explosion when handling finely-divided oxidizable material, it is advisable to reduce the inflammability of the dust by keeping it as moist as is consistent with the nature of the operation in hand, and to do whatever is practicable in the way of preventing a needless concentration of dust in the gases when the high voltage is applied. This, however, will not entirely remove the chance of ignition, and explosion doors, reliefs, and similar devices should be provided to obviate serious results in case an explosion should occur. Special precautions should be taken when installing the apparatus, to fasten the discharge electrode securely in place, for the purpose of minimizing vibrations and preventing the wire from coming near enough to the plate or pipe to produce an arc. Moreover the potential of the discharge electrode should be *gradually* raised in starting, and it is always advisable to use as low a voltage in the operation as is consistent with the principle of the apparatus."

Cost of Industrial Medicine

ACCORDING to a recent report by the National Industrial Conference Board, the average health service maintenance cost in 207 plants employing over 750,000 workers was about $5 per employe in

1921, as compared to $1.88 in 1915 and $2.21 in 1916. In some cases the cost ran as high as $12. This service is generally provided primarily to counteract the severity of plant accidents.

Death of Eminent Statistician

BY the sudden death, on September 2, by drowning while on a vacation fishing trip in Maine, of Frederick S. Crum, Ph.D., assistant statistician of the Prudential Insurance Company of America, the safety movement lost one of its most eminent and authoritative statisticians.

As Chairman of the Committee on Statistics of the Public Safety Section of the National Safety Council, Dr. Crum was to have delivered an important report at this year's National Safety Congress in Boston.

A graduate of Cornell University, he had been in the statistical work of the Prudential for 23 years, and had become the invaluable assistant of Dr. Frederick L. Hoffman, third vice president and statistician of the company.

Dr. Crum was the author of numerous publications on health and mortality topics and of charts on diseases. He was considered among the best authorities in the country on statistics of infant mortality, as well as an authority on automobile accident statistics.

He was a member of the American Economic Association, American Statistical Association, American Public Health Association, Casualty Actuarial and Statistical Society, and American Child Hygiene Association. Dr. Crum also acted as chairman of the committee on statistics in the public safety section of the National Safety Council. In New Jersey he was active in the Anti-Tuberculosis League and the New Jersey State Industrial Safety Museum. Dr. Crum contributed valuable information to the National Association of Corporation Training, covering health conditions in large industries. He was also a member of the Metropolitan District Safety Council and of the special advisory committee on statistics of the New York City Department of Health. During the war Dr. Crum served with the Emergency Fleet Corporation of the United States Shipping Board, giving about one-half of his time to the work.

The record of papers and addresses prepared by Dr. Crum, showing the wide character of his investigations, would fill a column in SAFETY ENGINEERING. Of particular interest to our readers the following may be mentioned: Health and mortality of the cotton mill operatives of Blackburn, Eng.; accidents to railway employes in the United States; aerial hazards; deaths from gases; deaths resulting from administration of anesthetics; industrial accidents in building trades of Canada and the United Kingdom; the chances of death by accident; accident liability of gas works employes and electricians; fatal accident rates; boiler explosions; records of loss of life and property on American shipping; accidents to railway employes in United Kingdom; fatal and non-fatal accidents in portable saw mills in New York State; street traffic accidents; losses by lightning; restaurant facilities for shipyard workers; significance of restaurants in industrial relations; how to figure labor turnover; public accidents and their cost; mortality of paid firemen; vehicular highway fatalities; statistical analysis of automobile fatalities; fatal accidents for one week in the United States, and human life conservation.

At the time of his death he was making deep research into the causes of automobile accidents and fatalities, with the hope of in a great measure reducing or overcoming them.

Wisconsin's Position on Acetylene

SUPPLEMENTING the bulletins it has issued this year relating to acetylene lighting plants and systems, the Industrial Commission of Wisconsin prepared a special bulletin for the press relating to the misuse of the bulletins mentioned. A copy of the special bulletin, dated June 2, has recently been received by SAFETY ENGINEERING. Having published the Wisconsin commission's previous bulletins on acetylene lighting, this magazine feels that it should also publish the bulletin of June 2 in order that the position

of the Industrial Commission may be fully understood:

MADISON, June 2. The Industrial Commission today issued a statement calling attention to the misuse of two bulletins it issued relating to acetylene lighting systems. It has come to the notice of the commission that these bulletins have been used by agents selling private electric light plants as a talking point against their competitors, the acetylene lighting systems. Such use has not been authorized by the commission and represents a distortion of the facts.

The two bulletins which the Industrial Commission has issued on acetylene lighting systems were intended to call attention to the hazards connected with such plants. These hazards, while serious, are entirely avoidable, in the opinion of the commission, and for this reason attention was directed to the best methods for overcoming the same, such as installation in well heated and well ventilated outside buildings when practicable, the careful handling and storage of carbide, and not allowing children and other inexperienced persons to tamper with the generators.

One month prior to the last bulletin on acetylene lighting systems, the Industrial Commission issued a similar bulletin on hazards from private electric light plants. In this bulletin it issued a warning that the fire hazard from private electric light plants is great, unless the wiring is done in strict accord with the National Electrical Code and by a competent electrician.

"Shun the men who tell you that these plants are free from danger and that expert knowledge is not needed to install them," was the warning of the commission.

Similarly the Industrial Commission has from time to time issued bulletins calling attention to the hazards connected with other methods of lighting, such as city gas, kerosene, and gasoline. In all cases the bulletins have been intended to point out dangerous practices and to call attention to methods of avoiding the same. "In pointing out the hazards connected with improved lighting systems, the Industrial Commission does not wish to be understood as conveying the impression that these systems are unsafe," said E. E. Witte, secretary of the commission. "The improved lighting systems now on the market which have the approval of the underwriters laboratories are as safe as the old time kerosene lamps, and safer if the precautions urged by the commission are heeded."

Industrial Engineers' Meeting

SPRINGFIELD, Mass., has been selected as the place for the fifth annual convention of the Society of Industrial Engineers, October 5, 6 and 7. Production, Industrial Relations, and other sectional meetings will be held Thursday afternoon, October 6. A chart exhibition has been arranged. Programs may be obtained from the office of the S. I. E., 327 South La Salle street, Chicago.

Chemical Exposition in New York

THE seventh National Chemical Exposition was held in New York City, September 12-17, in the 8th Coast Artillery Armory. Two of the most striking and comprehensive exhibits were those of the United States Bureau of Standards and the Canadian Department of the Interior.

Industrial Relations Convention

THE Industrial Relations Association of America has announced that its annual convention will be held in New York City, November 8, 9 and 10. Headquarters will be at the Waldorf-Astoria.

Traffic Safety Exposition

C. DE WITT DE MAR has announced the Fourth International Traffic Officers' Concention and Safety-First Exposition to be held in the Municipal Auditorium, Oakland, Cal., October 25-29, 1921. The publicity for this exposition includes 60 days of lectures (with films) by an expert on safety-first. These will be given to industrial plants, schools and other organizations. Mr. DeMar's headquarters are now in the Hotel Oakland, Oakland, California.

White Phosphorus in Matches

RECENT ratifications of the Berne convention prohibiting the use of white phosphorus in the match-making industry are announced by Czecho-Slovakia and Austria. Since its formulation in 1906 this convention has been previously adopted by Canada, Denmark, France, Germany, Italy, Luxemburg, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, Tunisia, and the United Kingdom.

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

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Regular Meetings—Fourth Friday of Each Month from September to June at 8 P. M. Next Meeting September 23.

A. S. S. E. MEMBERSHIP CAMPAIGN

THE American Society of Safety Engineers, whose list of members is already large and augmenting constantly, has entered upon a campaign to secure additional members which will be prosecuted vigorously during the next few months.

A statement of the history and achievements of the society since its reorganization and incorporation under the laws of the State of New York in 1915 has been prepared by the Membership Committee.

The society occupies a distinctive position among engineering organizations. It is devoted, wholly, to the prevention of accidents *by the development and application of engineering methods.* The society recognizes the value of the work done by other organizations in popularizing safety. But it selects for its own activities the great field that American industries, which employ millions of workmen, offer for the prevention of casualties, fatal and non-fatal, by purely engineering methods.

The safety engineers' work is needed not only in the industries, but also in the public streets, and in all places where human beings congregate in large numbers or pass to and fro. The average man is not a safety unit. He is a unit of carelessness, who must be made as nearly foolproof as possible by engineering safeguards. Since "all the world's a stage and all the men and women merely players," safety engineers must put in the props to make the stage safe for them. So, with "their exits and their entrances," the engineer must provide safety of entrance and egress—that is nobody's job but his.

The society holds monthly meetings to consider technical safety engineering problems. Its members listen to original, high-class papers covering a wide range of subjects; they co-operate with public officials and with other engineering and allied bodies; they assist in the formulation of safety standards for adoption by the States. They receive all of the proceedings of the society and have access to (and full privileges of) the Library of the United Engineering Societies, the finest collection of engineering and scientific literature in the world, including current technical periodicals and magazines. They have also the privilege of the Library Mail Service and the Library Service Bureau, the first making available the treasures of the library to members living outside of New York and the second offering facilities for special research work, through an expert staff, at a minimum cost.

These are by no means all of the advantages of membership. The Membership Committee's statement mentions, among other things, professional prestige and *entrée* to meetings of all other engineering societies at home and abroad through the A. S. S. E. introduction card. The several classes of membership, entrance fees and annual dues, etc., are described by the committee.

Qualification for membership is thus set forth: "A member shall be a graduate of a recognized technical engineering school or college, who shall have been

engaged in the practice of safety engineering for at least one year, or any person who has been in responsible charge of important work in that line for at least three years; the performance of the duties of a professor of engineering in a technical school of recognized standing shall be considered as an equivalent to an equal number of years of actual practice."

Safety engineering is a 100-per-cent job. It is not an incident, it is a whole thing. In modern industry the first consideration is not production but *safe production*. Security of the lives and limbs of operatives is more important than output.

SEPTEMBER MEETING

THE regular monthly meeting of the Society will be held on Friday, September 23, at 8 o'clock, in the Engineering Societies' Building, 29 West 39th street, New York City. The meeting will be devoted to a general discussion of the tentative draft of the Safety Code on Ladders for which the Society is sponsor and which was published in full in the August issue of SAFETY ENGINEERING.

CODES

AERONAUTICS.—The American Society of Safety Engineers has been invited to participate in the preparation of a Safety Code on Aeronautics, sponsors for which are the Bureau of Standards and the Society of Automotive Engineers. Mr. Harold M. Hine, a member of the Society and an expert on aviation, having written a comprehensive book on the subject, has been selected as the delegate of the A. S. S. E. to the Sectional Committee organized by the sponsor bodies to prepare such a code.

FOUNDRY.—The new national Foundry Code having been prepared by its sponsors, the American Foundrymen's Association and the National Founders' Association, is being submitted for review by the American Society of Safety Engineers and other organizations at the request of the American Engineering Standards Committee. For this purpose the A. S. S. E. will be represented by the following committee: Messrs. E. D. Haggerty, Chairman; J. W. Benner, D. M. Holman, B. N. Jones and J. A. Voss.

LIGHTNING PROTECTION.—The Society has been invited to designate one of its members to act as its delegate on the Sectional Committee which the American Institute of Electrical Engineers and the Bureau of Standards, sponsors, is organizing for the purpose of developing a Safety Code for Lightning Protection.

HEAD AND EYE.—The Head and Eye Code, recently completed and in the preparation of which the Society took an active part, is soon to be revised and the committee reorganized. Mr. George E. Sanford, Chairman of this Committee, is the delegate to the Sectional Committee of the Bureau of Standards.

ANNOUNCEMENTS

RALPH L. GOULD, former Director of Safety, Sanitation and Health, United States Rubber Company, New Haven, Conn., has accepted the secretaryship of the Cambridge Chamber of Commerce, Cambridge, Md.

F. V. Clark, formerly Advertising Manager for SAFETY ENGINEERING and a director of this Society, has resigned his membership.

PUBLICATIONS COMMITTEE

MR. FREDERICK P. PORTER has been appointed chairman of the Committee on Publications to succeed Mr. F. V. Clark, who resigned from that office upon leaving SAFETY ENGINEERING last July. Communications to the Committee on Publications may be addressed to the chairman at 376 Sixty-third street, Brooklyn, N. Y., or to the secretary of the American Society of Safety Engineers, 29 West Thirty-ninth street, New York, N. Y.

POSITION WANTED

Safety Engineer, five years' experience in safety and sanitation in oil fields, coal mines and factories; also compensation rating for coal mines, mine rescue and first aid. Age 31, married. Desires West but willing to go anywhere. Can reduce accidents. Address A. S. S. E., No. 9, SAFETY ENGINEERING, 126 Maiden Lane, New York City.

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 472 RESULTS OF DRIVE TO SECURE SCHEDULE RATING CREDITS. — Several years ago while showing an insurance company inspector through his plant, a factory superintendent remarked, "You fellows have to do about so much fault-finding for a living anyway, but you can't show me that you've saved a life nor prevented an accident. In my position as superintendent here I have increased the production 20 per cent without increasing the overhead cost."

Soon afterward the present "Rating Schedule" became effective, and among the items therein was a distinct credit allowed for a reduction of lost-time accidents. It is interesting to review the definite results in the reduction of lost-time accidents after a drive has been inaugurated to secure the credits. For instance:

Case 1.—*A cotton yarn mill, with a very bad accident history, employing* 2,000 *hands, losing* 300 *working days every* 3 *months.* The executives had spent quite a considerable amount of money in improving the physical conditions of the plant and had the finest guarded picker room in the country.

We secured permission to try an internal safety organization. Every executive, overseer, second or third hand, was asked to co-operate. The causes of accidents happening in different departments were discussed, a trappy basement drive was eliminated, guards misplaced were reported to the agent, who was keenly alive to every minute detail of operation and upkeep of the plant.

Our first quarter showed a 26 per cent net reduction of lost working days. Our next quarter there were *no* lost working days due to accidents, or a 100 per cent reduction. Five outside construction men engaged on new construction and building tenements lost 80 days, and were treated by the mill doctor. The balance of that year showed 60 working days lost with a crew of 1,000 hands working full time.

Case 2.—*What can be done in a silk and cotton mill where apparently every thing has been done to prevent accidents, not only by means of guards but also by strict discipline and by an agent who has picked his subordinates and drilled them in both production and safety methods.* This man was broad-minded enough not only to open his plant to the monthly calls but to co-operate in every possible way with the idea.

The same methods were used as in the preceding case and after a year's efforts the lost working days were reduced from 1,552 to 1,028, a saving of 27.5 per cent.

In both these plants the savings on the insurance were several thousand dollars for having the safety organizations. The savings both to employes and employer can be very readily estimated. Needless to add, these two large corporations have adopted the safety organization as part of their production departments because of the results shown.

Case 3.—*A large machine shop and foundry.* This plant started its own

safety organization, but when the boss of the yard told the boss carpenter how to run the pattern shop it was necessary to call in a third party. The yard was cleaned up, the charge for this condition removed, and a credit obtained for the safety organization. Then, for 6 months nothing was done. Finally, after a very close conference, the boss carpenter concluded there was something in it—dollars and cents for employer and employe. He took wood that was unsuitable for use, as it was scored with worm holes and had been condemned to be burned as scrap. By dressing off one side he secured enough "scrap" wood to make a gate for a wall opening. This means a dollar saved from firewood. Now he promises about a dozen more gates. Then he is going on to something else.

When the boss carpenter starts to guard the plant as a member of the safety organization there will be results. We are promised them. We expect them. We will get results!

What is the method used? Well, there seems to be no fixed rule. In the shop we used to ask, "Shall we bush this jig, make it light or heavy, lap the feet?" etc. The boss replied invariably, "Suit the conditions."

This is the answer then in safety work. After a careful survey and study of the problem before us, the thing to do is to "suit the conditions."

Is it a fair criticism to say that safety work has no commercial value? Certainly, it has great value! Our superintendent of the opening paragraph was misinformed. Anyway, we will forgive him as we had kept him so long that he was late for his dinner.

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No. 473

MIND VS. SAFETY.—The assurance of fairness between department heads and employes will create and develop the co-operative spirit which is the keynote of the coming era, and we should all get on the band wagon and cultivate this spirit. Fellowship, goodwill and confidence are three factors which should work for the welfare of all, by meeting the problems with broadmindedness; directing our efforts towards mininiizing the economic loss through the elimination of waste, and advancing the average man's ability by an intellectual approach in banishing all evil and destructive customs and increasing the forces of progress for construction and development, whereby we may enter on a more healthy plane of thought and action, which will result in making health contagious instead of being contaminated with "dis-ease."

The brain is the dynamo which feeds the "human motor," and this dynamo, if kept in condition by being lubricated with the "oil of constructive thoughts," will be reflected in the words and actions of the individual, for we are "what we think" and not what we "think we are." A man is exactly what he "thinks," just as what croaks in the pond is a frog and what sings so beautifully in the tree is a bird. It's a matter of looking and thinking "down" in the pond, or focusing our gaze "upward" in the trees, or rather looking towards the sky, for the sky is the limit in any honest endeavor.

Selfishness, hate, worry and unnecessary haste are products and actions that are governed by an improperly lubricated dynamo "human brain," which has a direct carriage on one's welfare, resulting in an eventual retrogression instead of advancement and progression; this has a bearing on safety as well as every other subject and endeavor.

By exercising self-control at all times in meeting so-called barriers as they appear, one will soon wonder at the change within him through having been able to overcome the obstacles,—for there is no doubt that we have all at one time or other overcome certain matters in our lives and have lived through them. Courage is necessary to meet the conditions, many have given up after they had weathered the worst part of the storm.

If everything went along as we like to think it should, we would soon find fault, for life would become too mechanical. The greatest successes and undertakings have been accomplished by those who conquered the gibraltar which was difficult to scale.

Self-control and repose, together with

a mind like a clear pool to neutralize acid thoughts, will fit the brain to give forth energy like a clear-flowing stream which will ramify to all the tissues of the body, and place one on a higher plane of thought and action.

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No. 474

RELATION OF "NERVOUSNESS" TO SAFETY.—It has been said, perhaps unfairly, that we are "a nation of neurasthenics." This term is about as difficult to define as it is to diagnose. Neurasthenia may be but one of a group of symptoms in one case, a definite disease in another; it is often questionable regarding the latter, the signs pointing thereto usually suggesting a more or less serious underlying condition. It is but part and parcel of that gigantic and formidable list under the head "Nervousness," and this too is difficult of detection as to the underlying cause or causes.

When we say a man is "nervous," most of us are simply cognizant of an abnormal condition, groping in the dark for the real, the tangible, the way to really help ourselves or others. In using the above term, and rather loosely in this sense too, we consciously include everything from simple tremor of the hands or mental irritability through the psychoses (that group of combined mental and nervous disorders) to the mental states aligned with or being true insanity. So a word to the worker—*Be more careful how you use the term "nut."* You are playing with the fire of emotional instability, with a man's success on the job, often and too much so, with his personal safetly, and perhaps yours. Many an accident is not caused by defective machinery, but *by a defective man on the job.* The accidents where somebody gets mad and loses his temper in a big shop are legion—an example of momentary hysteria, the mind off the job.

We all know of "shell-shock," that peculiar malady, a by-product of war, often seemingly undefinable, yet nevertheless unfitting soldiers for the working hand. We all know too of the afternoon fatigue both of brain and physical workers, and with it in some industries, of the rising tide of accidents, beginning about 3 p. m. and ending about half an hour before closing time. This last is accounted for by the fact that men "nerve themselves up" for the last few minutes.

To find the cause of this afternoon fatigue is a problem. It may be due to the pounding of machinery for hours in the ears of the man who should be placed elsewhere, to the eye-strain of the deskman, superinduced often by defective lighting arrangements, to defective teeth, to tubercular conditions, to midday meal excesses, especially greasy food washed down with carbonated drinks too cold for a hot man on a hot day, or last, but not least, to nerve-tear produced by a wrangling, back-biting, "passing the buck" organization wherein no man is as loyal as he should be, and each day but a repetition of clashing mental gears, with no human, fair-deal lubricant used by either management or employe; both being guilty. Other causes can be listed. Noise tires some men; jarring plant relations, home problems, physical work, or mental strain tire others. Some men are afraid of themselves with a sensitiveness which is a definite counteragent to personal success. The treatment of the above is largely dependent on the cause producing the condition.

When we really come down to what is necessary for the man who is "nervous," the complete physical examination is the first to consider. It should be made by the physician of the plant or the family physician; in either case the man should be convinced beforehand by a friend or one of the above that the examination is needed. What he especially does not need is the gushing sympathy of a feminine welfare worker who should be raising her own children. Likewise let us rule out completely the self-appointed layman-diagnostician, the fellow in the shop who has "had lots of sickness in his own family," or spreads the news that he has a "family medicine book" or a pamphlet conceived in quackery and born in the form of a nostrum advertisement. What this man truly needs is confidence in a well-trained physician, a thorough searching examination, a frank statement of what is known or suspected to be the trouble, and the willingness to follow intelligent advice.

This is not necessarily a plea for compulsory physical examination,—too many of these, run on a wholesale "man to the minute" basis, are worth little; it is however, a plea for a man to become induced to take stock of himself, to get on the right road, and to follow that road, that "his days may be long in the land." Men sincerely interested in safety might as well realize that some of the factors mentioned above are tremendous factors in safety records, in accidents of seemingly undefinable causes, in lowered production. Man is a machine which is more often allowed to remain "run down" than the steel and iron combinations he fabricates with.

Live closer to your industrial surgeons, you safety men, and work together not to eliminate the worker but to keep him, to save him from himself, to save him for your own plant.

Prizes for July Articles

First Prize. No. 468. A. M. Underhill, Safety Engineer, S. F. Bowser & Company, Fort Wayne, Indiana.

Second Prize. No. 469. H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio.

Prizes for August Articles

First Prize. No. 471. Harrington Shafer. Safety Inspector, Minnequa Steel Works, Colorado Fuel & Iron Co., Pueblo, Colorado.

Second Prize. No. 470. H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio.

Comments by Members of the July Committee

No. 468 has the right idea about eye protection. It is very essential to protect the eyes of the workers.

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I cast my vote for the author of Article 469, on "Safety vs. Fatigue." He brings out some points which really are food for thought, for there is no doubt that his explanation of how fatigue has a bearing on increased accidents is a phase that should be studied.

When employes are engaged at work which appeals to them, one will observe that they apply their attention to getting out the work in the best way, and naturally the number of injuries is at a minimum, after the employe has become accustomed to the work.

For instance, a stenographer who has been away from his regular stenographic work for several months and then returns to his former work without any preparatory exercise, will invariably strike the wrong letters on the keyboard, and get out poor letters until he becomes "acclimated." So it is with an employe following shop practice; after a lull in the business, he is practically as "new" as a "green" man until he finds his footing again.

If an employe has home worries on his mind, or does not like the work in which he is engaged, the results will be shown in the nature of the product as well as in increased injuries, for his mind

cannot be on the work when there is an interference with the proper flow of thought currents.

Proper thought currents transmitted by the brain "human switchboard" produce a healthy mind, which in turn is reflected in every action of the individual governed or controlled by it.

Comments by Members of the August Committee

My vote goes to 470. The value of unexpected visits cannot be overestimated. In my own field of work I drop into the works, sometimes early in the evening, at other times later in the night, and I am certain that the knowledge that I may drop in at any time keeps some of the employes from pulling off stunts that otherwise might be attempted. I am in thorough accord with the writer.

I cast my vote for 471. I think the writer of this article has brought forth a worthy subject. At this time of general depression a foreman can take his pick of men, selecting those who are willing to work and comply with the company's rules (whereas hitherto, they have been entirely indifferent). The foreman can now put his men in a 100 per cent safety attitude. If he does not, I say throw him out and give a real man a chance at the job, for it can be done.

My report on the articles in the August number is as follows:

Article 471 has some very good points, in fact, the last paragraph expresses one of the biggest truths of the present conditions. However, I cannot agree with the second part, as our experience is just the opposite of that cited. Our records show that our lost time accidents are approximately 53 per cent lower than last year, and our reduction in man-hours about 18 per cent, with very few new employes hired since the first of the year.

As the result of this experience, I am inclined to believe that labor turn-over, necessitating the hiring of new employes, does increase the number of accidents in a plant.

I vote for 471. His subject is good and there is an air of friendliness in his article that appeals to me.

Poorly Maintained Saws a Cause of Accidents

IN a talk before the ninth annual Safety Congress Mr. Henry Schreiber, Deputy of the Industrial Commission of Wisconsin, describes the efforts made by the Wisconsin commission to reduce the number of accidents from woodworking machinery, particularly saws. Nearly all of the saw accidents happen on hand-feed circular rip-saws, he says. Out of fifty saw accidents, forty-nine are from this type, even when most of the saws are guarded and equipped with splitters.

The conclusion is that accidents occur because the saws themselves are not kept in proper conditon; they are not hooked nor hammered, they have no set, no teeth, and have not been filed, gummed, or sharpened for weeks. A saw in use ten hours a day should be changed twice a day. There should be someone definitely responsible for the changing, and on schedule time. The time to change saws should not be left to the convenience or inclination of the filer. Fixing the responsibility for frequent changes will reduce accidents at least 75 per cent.

Tenth Annual Safety Congress

(*Continued from page 99*)

Why Grinding Wheels Break (demonstration with model).—E. W. Dodge, Assistant to General Manager, Abrasive Company, Philadelphia.

Tuesday, September 27, 10 a. m.

Room 15, First Floor

CHEMICAL. Chairman, I. V. Kepner, Safety Director, Pennsylvania Salt Manufacturing Company, Philadelphia. Vice Chairman, S. H. Kershaw, Safety Engineer, Hercules Powder Company, Wilmington, Del. Secretary, M. J. McDonough, Safety Engineer, E. I. du Pont de Nemours & Co., Philadelphia.

Business Session.

Report of Committee on Special Reports: Safe Practice in Handling Sulphuric Acid.

Round Table Discussions:

General Handling of Caustics.

Removal of Caustics from Containers.

Tuesday, September 27, 10 a. m.

Room 166, First Floor

CONSTRUCTION. Chairman, L. D. Woedtke, Director of Safety, Fred T. Ley & Co., Inc., Springfield, Mass. Vice Chairman, F. L. Hurlbutt, Standard Safety Equipment Company, Chicago. Vice Chairman, A. F. Greensfelder, Fruin-Colnon Contracting Co., St. Louis. Secretary, F. A. Davidson, Safety Engineer, Dwight B. Robinson Co., New York City.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Experience Rating of Contractors' Risks for Compensation Insurance.—L. L. Hall, Superintendent of Schedule Rating and Inspection, National Workmen's Compensation Service Bureau, New York City.

Boosting Safety First Through Contractors' Organizations.—Frank S. Robinson, Secretary, General Builders Association, Detroit.

The Mechanical Safeguarding of Equipment.—Raymond A. Talbot, Manager, Equipment Department, Fred T. Ley & Co., Inc., Springfield, Mass.

Tuesday, September 27, 10 a. m.

Auditorium, First Floor

EDUCATION. Chairman, A. T. Morey, General Manager, Commonwealth Steel Company, Granite City, Ill. Vice Chairman, Dr. E. George Payne, Principal, Harris Teachers' College, St. Louis. Secretary, C. W. Price, General Manager, National Safety Council.

Dr. Payton Smith, Massachusetts State Commissioner of Education, presiding.

Outline of Method of Safety Instruction in Public and Parochial Schools.—Dr. E. George Payne, Principal, Harris Teachers' College, St. Louis.

Ten minute reports by delegates from several cities where Safety Instruction has been given successfully in Graded Schools.

Round Table Discussion.

Business Session.

Tuesday, September 27, 10 a. m.

Room 370, Third Floor

ELECTRIC RAILWAY. Chairman, J. H. Mallon, Assistant General Superintendent of Transportation, The Metropolitan West Side Elevated Railway Company, Chicago. Vice Chairman, James Harmon, Manager, Safety Department, Kentucky Utilities Company, Louisville, Ky. Secretary, John H. Cox, Adjuster, Cleveland Electric Railway, Cleveland.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Reflections of the Executive on Safety.—F. R. Coates, President and General Manager, Toledo Railway and Light Co., Toledo, Ohio.

Rejecting the Grundys from Safety First.—Miss Laura Roadifer, Philadelphia Rapid Transit Company, Philadelphia.

Tuesday, September 27, 2 p. m.

Massachusetts Institute of Technology

ENGINEERING. Chairman, L. A. DeBlois, Manager, Safety Section, E. I. du Pont de Nemours & Co., Wilmington, Del. Vice Chairman, B. F. Tillson, Assistant Superintendent, New Jersey Zinc Co., Franklin, N. J. Secretary, S. J. Williams, Secretary, National Safety Council.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Lessons Learned from Oxy-acetylene and Other Gas Welding and Cutting Processes.—J. I. Banash, Consulting Engineer, Chicago.

Safety in the Evaporation of Volatile Solvents.—Dr. Warren K. Lewis, Massachusetts Institute of Technology, Cambridge, Mass.

Report of Nominating Committee.

Tuesday, September 27, 9:30 a. m.

Room 370, Third Floor

LOCAL COUNCIL OFFICERS. Chairman, C. W. Price, General Manager, National Safety Council.

Round Table Discussion: How to Organize a Live Local Council. This session will be of special interest to delegates who have recently organized, or who are planning to organize, a local council in their communities.

Tuesday, September 27, 10 a. m.

Room 443, Fourth Floor

METALS. Chairman, J. A. Oartel, Chief of Safety Bureau, Carnegie Steel Co., Pittsburgh. Vice Chairman, John A. Northwood, Superintendent, Safety and Welfare Department, Cambria Steel Company, Johnstown, Pa. Secretary, J. R. Mulligan, Supervisor, Accident Prevention and Education, Bethlehem Steel Company, Bethlehem, Pa.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Safe Practices in Pouring in a Foundry.—A. B. Root, Jr., Mechanical Engineer, Hunt-Spiller Manufacturing Corporation, Boston.

Elimination of Steam during Pouring.—R. E. Shaw, District Manager, B. F. Sturtevant Co., Boston.

Electrical Hazards in Foundries and Steel Mills.—Walter Greenwood, Safety Engineer, Carnegie Steel Company, Youngstown, Ohio.

Tuesday, September 27, 10 a. m.

Room 448, Fourth Floor

MINING. Chairman, B. F. Tillson, Assistant Superintendent, The New Jersey Zinc Co., Franklin, N. J. First Vice President, Dr. A. F. Knoefel, United States Bureau of Mines, Terre Haute, Ind. Second Vice Chairman, George Martinson, Safety Engineer, Pickands, Mather & Co., Hibbing, Minn. Third Vice Chairman, Guy F. Johnson, Homestake Mining Company, Lead, S. D. Secretary, R. H. Seip, Safety Engineer, The New Jersey Zinc Company, Franklin, N. J.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Underground Transport.—Storage Battery Locomotives.—Charles E. Stuart, Consulting Engineer, New York City; E. V. Daveller and R. E. Renz, Butte and Superior Mining Company, Butte, Mont.; Fred Jones, Superintendent, Portland Mine, Cripple Creek, Col.

Trolley Locomotives.—Frederick W. Whiteside, Chief Engineer, Victor-American Fuel Co., Denver, Col.

Animal Haulage.—E. L. Solomon, Kingston Coal Co., Kingston, Pa.

Rope Haulage.—Ralph Moore, Chief Engineer, Hughes No. 2 Mine, Cassandra, Pa.

Block Signal and Dispatching Systems.—R. T. Murrill, Safety Engineer, Inspiration Consolidated Copper Mine, Miami, Ariz.

Compressed Air Haulage.—Guy J. Johnson, Safety Engineer, Homestake Mining Company, Lead, S. D.

Tuesday, September 27, 10 a. m.

Room 249, Second Floor

PACKERS AND TANNERS. Chairman, A. B. Drummond, Wilson & Co., Union Stock Yards, Chicago. Vice Chairman, Henry Batchelder, A. C. Lawrence Leather Company, Peabody, Mass. Secretary, W. F. McClellan, Safety Inspector, Armour & Company, Union Stock Yards, Chicago.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Accident Prevention from a Medical Standpoint.—Dr. W. H. Lipman, Medical Director, Swift & Company, Union Stock Yards, Chicago.

The Mechanical Side of Accident Prevention in the Packing Industry.—George Keene, Swift & Company, Union Stock Yards, Chicago.

Safe Motor Truck Operation.—C. P. Cary, Manager, Freight Transportation Department, Packard Motor Car Company, Boston.

Tuesday, September 27, 10 a. m.

Room 272, Second Floor

PAPER AND PULP. Chairman, G. E. Williamson, Executive Engineer, Strathmore Paper Company, Mittineague, Mass. Vice Chairman, E. P. Young, Interlake Pulp & Paper Company, Appleton, Wis. Secretary, Miss Mary Baker, Kimberly-Clark Company, Neenah, Wis.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

The Foreman's and Manager's Responsibilities in Paper Mills.—Roy J. Murbach, The Gardner & Harvey Company, Middletown, Ohio.

Using a Camera to Promote Safety in Paper Mills. —A. E. Frampton, Editor, "The Hammermill Bond," Hammermill Paper Company, Erie, Pa.

Beater Room Hazards.—Charles Walker, Employment Manager, Eastern Manufacturing Company, Bangor, Maine.

Tuesday, September 27, 10 a. m.

Room 222, Second Floor

PUBLIC UTILITIES. Chairman, C. E. Morrison, Utilities Mutual Insurance Company, New York City. Vice Chairman, J. F. Naylon, New York Telephone Company, Newark, N. J. Secretary, J. J. O'Connor, Peoples Gas Light & Coke Company, Chicago.

Reports of Chairman, Secretary, Committee. Appointment of Nominating Committee.

Addresses:

The Necessity of the Support of Executives in Accident Prevention Work.—Chas. B. Scott, General Manager, Bureau of Safety, Chicago.

Discussion by H. C. Lucas, Treasurer, Philadelphia Electric Company, Philadelphia; R. E. McDougall, Manager, New York and Harlem Railroad Company, New York City.

Hazards in Hydro-Electric Plants.—Alex E. Bauhan, Superintendent of Stations, Pennsylvania Water & Power Company, Baltimore.

Discussion by W. H. Mulligan, Hydro-Electric Power Commission of Ontario, Toronto, Ontario; John Morse, General Superintendent, Shawinigan Water & Power Company, Montreal, Quebec.

Risks in Handling and Storing Coal, Oil, and By-Products.—C. E. Paige, Manager, Worcester Gas Light Company, Worcester, Mass.

Discussion by A. O. Mitchell, Northern Indiana Gas & Electric Company, Hammond, Ind.; James B. Douglas, United Gas Improvement Company, Philadelphia.

Tuesday, September 27, 1 p. m.

Boston City Club, 12 Somerset street

PUBLIC UTILITIES — GET-TOGETHER LUNCHEON.

Speakers:

C. L. Edgar, President, Edison Electric Illuminating Company, Boston.

Milan R. Bump, President, National Electric Light Association, New York City.

Wm. McClellan, President, American Institute of Electrical Engineers, New York City.

Jos. B. McCall, President, Philadelphia Electric Company, Philadelphia.

Tuesday, September 27, 10 a. m.

Room 431, Fourth Floor

RUBBER. Chairman, E. H. Fitzgerald, Federal Rubber Company, Cudahy, Wis. Vice Chairman, E. W. Beck, U. S. Rubber Company, New York City. Secretary, Ray N. Watson, Safety Engineer, Goodyear Tire and Rubber Company, Akron, Ohio.

Address by the Chairman.

Standard Statistics of the Rubber Industry.—Ray N. Watson, Goodyear Tire and Rubber Company, Akron, Ohio.

Fire Hazards and Static Electricity in Rubber Plants.—F. H. Hoxie, Engineer and Special Inspector, Associated Factory Mutual Fire Insurance Companies, Boston.

Round Table Discussion: New Stunts to Promote Safety in the Rubber ndustry, Including Conducting Safety Work at Minimum Expense.

Appointment of Nominating Committee.

Tuesday, September 27

RUBBER SECTION LUNCHEON. Toastmaster, H. T. Martin, Manager, Health and Safety Department, Fisk Rubber Company, Chicopee Falls, Mass.

Address:

H. S. Firestone, President, Firestone Tire and Rubber Company, Akron, Ohio.

Special entertainment also to be provided.

Tuesday, September 27, 10 a. m.

Room 436, Fourth Floor

STEAM RAILROAD. Chairman, T. H. Carrow, Supervisor of Safety, Pennsylvania System, Philadelphia. Vice Chairman, Harry A. Adams, Assistant to General Manager, Union Pacific Railroad, Omaha, Neb. Secretary, A. W. Rohweder, Supervisor of Safety, Duluth, Missabe & Northern Railroad, Duluth, Minn.

Reports of Chairman, Secretary, Committees.

Addresses:

Safety First—from a Moral Viewpoint.—John F. Moore, Associate General Secretary, International Committee, Railroad Y. M. C. A., New York City.

The Safety of Man.—Rev. Walt Holcomb, Evangelist, Cartersville, Georgia.

The Importance of Safety in Railroad Operation.—C. W. Galloway, Vice President in Charge of Operation and Maintenance, The Baltimore and Ohio Railroad Company, Baltimore.

Upon Whom Does the Burden Fall When Death or Disability Removes a Producer from our Midst?—E. L. Bair, Vice President, Benefit Association of Railway Employees, Chicago.

Appointment of Nominating Committee.

Tuesday, September 27, 10 a. m.

Room 462, Fourth Floor

TEXTILE. Chairman, C. H. Stowell, Pacific Mills, Lawrence, Mass. Vice Chairman, A. E. Conrath, International Harvester Co., St. Paul, Minn. Secretary, E. F. King, H. A. Hale, Jr., & Co., Boston.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Safety Engineering in the Textile Plant.—E. F. King, H. A. Hale, Jr., & Co., Boston.

The Textile Safety Code.—C. E. Pettibone, American Mutual Liability Insurance Company, Boston.

Tuesday, September 27, 10 a. m.

Room 472, Fourth Floor

WOODWORKING. Chairman, E. Ross Farra, American Car & Foundry Co., Wilmington, Del. Vice Chairman, F. A. Lovett, Industrial Accident Prevention Associations, Toronto, Ont. Secretary, F. A. Barker, Manager, Underwriting Department, Lumbermen's Mutual Casualty Co., Chicago.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Organizing for Safety in Woodworking Plants.—Harry Guilbert, Manager, Safety and Service Department, Haskell & Barker Car Company, Michigan City, Ind.

Designing Woodworking Machines as a Factor of Safety.—R. McA. Keown, Engineer, Industrial Commission of Wisconsin, Madison, Wis.

How Can Woodworking Safeguards Be Kept in Place? (Discussion).

THIRD DAY

Wednesday, September 28, 2 p. m.

Auditorium, First Floor

GENERAL SESSION: ENGINEERING AND SAFETY. (Auspices of Engineering Section.)

The Engineer's Contribution to the Safety of Human

Life.—H. W. Forster, Vice President, Independence Bureau, Philadelphia.

Increasing Production through Accident Prevention. —L. P. Alford, Editor, "Management Engineering," New York City.

Dust Explosion Hazards (demonstrations with models and primary showing of motion picture film depicting explosion hazards).—D. J. Price, Engineer in Charge of Development Work, Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.

Wednesday, September 28, 4:30 p. m.

MOTION PICTURES ON SAFETY

Dust Explosions.—First showing of a new safety film on dust explosion hazards. To be shown in connection with address and demonstrations given by Mr. D. J. Price, Bureau of Chemistry, U. S. Department of Agriculture, at the Wednesday afternoon general session.

Section Meetings.

Wednesday, September 28, 9:30 a. m.

Room 446, Fourth Floor
AUTOMOTIVE.—Second Session.

Fire Prevention.—T. Alfred Fleming, Supervisor, Conservation Department, The National Board of Fire Underwriters, New York City.

Dust Explosions—Their Nature, Causes and Methods of Prevention (demonstrations with models).—David J. Price, Engineer in Charge of Development Work, Bureau of Chemistry, United States Department of Agriculture, Washington, D. C.

Electrical Hazards and Proper Installation of Equipment.—W. J. Pefferly, Square D Company Detroit.

Wednesday, September 28, 9:30 a. m.

Room 15, First Floor
CHEMICAL.—Second Session.

Protection from Excess Pressure in Chemical Apparatus.—John S. Shaw, Assistant to General Manager, Hercules Powder Company, Wilmington, Del.

Business Session.

Round Table Discussion: Chemical Section Problems. (List of problems for discussion to be announced at the meeting.)

Wednesday, September 28, 9:30 a. m.

Room 166, First Floor
CONSTRUCTION.—Second Session.
Report of Nominating Committee.
Addresses:

Co-operation of the Sub-contractor in Accident Prevention.—A. H. Lewis, Manager, Safety Department, Thompson-Starrett Company, New York City.

Protection of the Public.—A. D. Risteen, Director of Technical Research, Travelers Insurance Company, Hartford.

General Discussion on Report of Statistical and Standardization Committee.—This committee has made an exhaustive study of accident prevention in the construction industry and will be prepared to present recommendations on rules, standards, statistical forms, etc., for adoption by the section.

Wednesday, September 28, 9:30 a. m.

Room 370, Third Floor
ELECTRIC RAILWAY.—Second Session.
Report of Nominating Committee.
Addresses:

The Attitude of the Public Toward the Railway's Participation in No-Accident Week Campaigns.—John E. Cullen, United Railways & Electric Company, Baltimore.

Nationalizing and Standardizing Railroad Crossing and Grade Signs.—R. S. Messenger, Claim Agent, Rochester and Syracuse Railroad, Syracuse, N. Y.

Wednesday, September 28, 2 p. m.

Room 370, Third Floor
LOCAL COUNCIL OFFICERS.—Second Session.
Round Table Discussions:
Financing Public Safety.
How to Secure Effective Publicity.
How to Conduct a Successful School for Foremen.

Wednesday, September 28, 9:30 a. m.

Room 443, Fourth Floor
METALS.—Second Session.
Report of Nominating Committee.
Addresses:

Safe Practices in Rolling Mills.—Fred Johnson, Superintendent of Rolling Mills, South Works, American Steel and Wire Company, Worcester, Mass.

Safe Practices at By-Products Coke Plants.—F. F. Marquard, Superintendent, By-Products Plant, Clairton Works, Carnegie Steel Co., Clairton, Pa.

Wednesday, September 28, 9:30 a. m.

Room 448, Fourth Floor
MINING.—Second Session.
Mine Fire Prevention and Fire Fighting:
In Anthracite Mines.
In Bituminous Mines.—Joseph W. Reed, Safety Engineer, Consolidation Coal Company, Fairmont, W. Va.
Experiences in a Coal Mine Fire (illustrated with slides).—G. M. Gillette, Consolidation Coal Co., Fairmont, W. Va.
In Metal Mines—The Use of Carbon Dioxide in a Metal Mine Fire.—H. M. Wolflin, California Industrial Commission, San Francisco, Cal.

Wednesday, September 28, 9:30 a. m.

Room 249, Second Floor
PACKERS AND TANNERS.—Second Session.

The Safety Man and Athletics.—G. A. Brown, Director of Personnel, The Cleveland Provision Company, Cleveland.

Boilers and Tanks or Pressure Vessels.—J. P. Morrison, Chief Inspector, The Hartford Steam Boiler Inspection and Insurance Company, Chicago.

Mechanical Safeguards.—Joel E. Ballentine, Master Mechanic, A. C. Lawrence Leather Company, Peabody, Mass.

Wednesday, September 28, 9:30 a. m.

Room 272, Second Floor
PAPER AND PULP.—Second Session.
Report of Nominating Committee.
Addresses:

Paper Mill Ventilation.—H. S. Taylor, The Management Engineering and Development Company, Dayton, Ohio.

Handling Liquid Chlorine.—D. K. Bartlett, Electro Bleaching Gas Co., New York City.

Social Phases of Safety Work.—F. H. Rosebush, Department of Industrial Relations, Nekoosa-Edwards Paper Company, Port Edwards, Wis.

Wednesday, September 28, 9:30 a. m.

Room 429, Fourth Floor.
PUBLIC SAFETY. Chairman, C. M. Talbert, Former Director of Streets and Sewers, St. Louis. Vice-Chairman, David Van Schaack, Aetna Life Insurance Company, Hartford. Vice Chairman, C. B. Pritchard, Director of Public Safety, Pittsburgh. Secretary, Carl L. Smith, Manager, Central Mississippi Valley Division, National Safety Council, St. Louis.

Reports of Chairman and Secretary. Appointment of Nominating Committee. Report of Committee on Statistics.—Frederick S. Crum, Assistant Statistician, Prudential Insurance Company of America, Newark, N. J.

Report of Boy Scouts Committee.—J. P. Freeman, Assistant National Field Director, Boy Scouts of America, Chicago.

Report of Committee on School Hazards.—Dr. E. Geo. Payne, Principal, Harris Teachers' College, St. Louis.

Report of Committee on Elevator Hazards.—E. P. Elzy, Aetna Life Insurance Co., Hartford.

Wednesday, September 28, 9:30 a. m.

Room 222, Second Floor
PUBLIC UTILITIES.—Second Session.
Report of Nominating Committee.
Addresses:

The Development of Accident Prevention and First Aid Work in the Telephone Field.—F. M. Downey, Special Agent, New York Telephone Company, Newark, N. J.

Discussion by representative from Bell Telephone Company of Pennsylvania, Philadelphia, and H. S. Warren, American Telephone & Telegraph Company, New York City.

Care in the Construction and Maintenance of Overhead Lines.—A. B. Gates, Superintendent of Overhead Lines, Commonwealth Edison Company, Chicago.

Discussion by H. J. Burton, Consumers Power Company, Jackson, Mich, and Chas. Durfee, Rochester Gas & Electric Corporation, Rochester, N. Y.

The Use of Protective Devices.—Wills Maclachlan, Consulting Engineer, Toronto, Ontario.

Discussion by E. R. Dobbin, Empire Gas & Electric Company, Geneva, N. Y., and Geo. R. Rinke, Utilities Mutual Insurance Company, New York City.

Wednesday, September 28, 9:30 a. m.

Room 431, Fourth Floor

RUBBER.—Second Session.

Safety—From the Chemist's Standpoint.—Dr. Lothar E. Weber, Boston India Rubber Laboratory, Boston.

Keeping a Rubber Factory Clean.—William S. Jameson, Fisk Rubber Company, Chicopee Falls, Mass.

Practical Plans for Medical Supervision in Rubber Plants.—Dr. R. S. Quinby, Service Manager, Hood Rubber Company, Watertown, Mass.

Wednesday, September 28, 9:30 a. m.

Room 436, Fourth Floor

STEAM RAILROAD.—Second Session.

Round Table Discussion. Interstate Commerce Commission Bulletin No. 78.—Five minutes will be devoted to presentation and five minutes to discussion of each of the following topics:

Train Accidents:

Negligence of Employes.—F. R. Mitchell, Superintendent of Safety, New York, New Haven and Hartford Railroad, New Haven, Conn.

Defects or Failure of Equipment.—S. G. Watkins, Supervisor of Safety, Boston and Maine Railroad, Boston. (Invited).

Defects in or Improper Maintenance of Way and Structures.—T. R. McCampbell, Safety Agent, Cleveland, Cincinnati, Chicago and St. Louis Railroad, Indianapolis, Ind.

Train Service Accidents:

Coupling and Uncoupling Accidents.—C. L. La Fountaine, General Supervisor of Safety, Great Northern Railway, St. Paul, Minn.

Operating Locomotives.

Operating Hand Brakes and Hand Switches.—W. J. Orr, Safety and First Aid Officer, Toronto, Hamilton and Buffalo Railway Company, Hamilton, Ontario.

Coming in Contact with Fixed Structures.—D. E. Satterfield, Safety Inspector, Chesapeake and Ohio Railway Company, Richmond, Va.

Getting on or off Engines or Cars, Falling from Engines or Cars, Struck or Run Over by Engines or Cars.—E. M. Harris, Safety Inspector, New York, New Haven and Hartford Railroad, New Haven, Conn.

Non-Train Accidents:

Working Machinery; Use of Hand Tools; Burns, Scalds, and Punctures.—W. H. Ganzert, Safety Inspector, Chesapeake and Ohio Railway Company, Richmond, Va.

Electric Currents, Falls of Objects or Persons.—E. S. Chapin, Safety Inspector, Pennsylvania Railroad, Philadelphia.

Handling Rails, Ties, Timbers, etc.—H. E. Astley, Superintendent, New York, New Haven and Hartford Railroad, Taunton, Mass.

Handling Freight, Supplies, Material, etc.—J. T. Pratt, Safety Supervisor, Philadelphia and Reading Railroad, Reading, Pa. (Invited).

Wednesday, September 28, 9:30 a. m.

Room 462, Fourth Floor

TEXTILE.—Second Session.

Report of Nominating Committee.

Addresses:

Accident Hazards and Ways of Meeting Them.—Sydney Ingham, Ludlow Manufacturing Associates, Ludlow, Mass.

General Discussion: Textile Safety Problems.

Wednesday, September 28, 2 p. m.

Room 222, Second Floor

WOMEN IN INDUSTRY. Chairman, Miss Tracy Copp, Special Agent, Federal Board for Vocational Education, Washington, D. C. Vice Chairman, Miss Nesta C. Edwards. Consultant in Industrial Service, Chicago. Secretary, Miss Alice B. Smith, Employment Manager, A. George Schulz Company, Milwaukee, Wis.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Fatigue Study, a First Step in Safety Work.—Frank B. and Lillian M. Gilbreth, Consulting Engineers, Montclair, N. J. (Paper to be presented by Mrs. Lillian M. Gilbreth).

Industrial Posture and Seating.—Miss Nelle E. Swartz, Chief, Bureau of Women in Industry, New York State Department of Labor, New York City.

Discussion by Dr. Reynold A. Spaeth, Associate in Physiology, School of Hygiene and Public Health, Johns Hopkins University, Baltimore.

Employment of Women, the New Force in Industry.—Miss Ida M. Tarbell, New York City. Discussion by Miss Ethel M. Johnson, Assistant Commissioner, Massachusetts State Department of Labor and Industries, Boston.

(The Women in Industry Section will meet jointly with the Health Service Section and the American Association of Industrial Physicians and Surgeons at the General Session on Health and Sanitation, Thursday afternoon, September 29.)

Wednesday, September 28, 9:30 a. m.

Room 472, Fourth Floor

WOODWORKING.—Second Session.

Exhaust Systems for Woodworking Machines.—H. M. Nichols, Manager, Conveying and C. I. Fan Department, B. F. Sturtevant Company, Boston.

Hygiene in Relation to Woodworking Plants.

The New Safety Code for Woodworking Plants.—Dr. Lucian W. Chaney, United States Bureau of Labor Statistics, Washington, D. C.

(This code will in all probability be used by the various States as a guide or model in formulating legal requirements for safety in the woodworking industries. This discussion will, therefore, be of interest to every one who is giving attention to the safeguarding of woodworking machines.)

FOURTH DAY

Thursday, September 29, 9:30 a. m.

Auditorium, First Floor

JOINT MEETING OF MANUFACTURING SECTIONS. Chairman, C. P. Tolman, President, National Safety Council.

Better Industrial Lighting—

Why?—R. W. Shenton, National Lamp Works, Cleveland.

How?—A. S. Turner, Edison Lamp Works, Harrison, N. J.

The Need for Accident Prevention Work and Methods to be Employed during the Present Industrial Depression.—W. E. Worth, International Harvester Company, Chicago.

Discussion by General E. L. Sweetser, Commissioner of Labor and Industries, State of Massachusetts.

Round Table Discussion on Preceding Subject.

Thursday, September 29, 2 p. m.

Auditorium, First Floor

GENERAL SESSION: HEALTH AND SANITATION. Joint Meeting of Health Service Section, American Association of Industrial Physicians and Surgeons, and Women in Industry Section.

Prevention of Occupational Diseases Through Workmen's Compensation Legislation.—F. M. Wilcox, Chairman, Industrial Commission of Wisconsin, Madison, Wis.

The Working Day and Industrial Health.—Dr. Reynold A. Spaeth, Associate in Physiology, School of Hygiene and Public Health, Johns Hopkins University, Baltimore.

Health of Industrial Workers and the Public Welfare.—Brigadier-General Charles E. Sawyer, Medical Reserve Corps, U. S. A., Washington, D. C. (President Harding's personal physician).

What Has Been Done for the Health of the Industrial Worker in Framingham?—Dr. Donald B. Armstrong, Executive Director, Community Health and Tuberculosis Demonstration of the National Tuberculosis Association, Framingham, Mass.

Thursday, September 29, 4:30 p. m.

MOTION PICTURES ON SAFETY.

Hurry Slowly.—A public safety film produced by Ford Motor Company. (One reel.)

When Women Work.—A film prepared by the Women's Bureau of the U. S. Department of Labor, to visualize and contrast good and bad working conditions for women. (Two reels.)

Thursday, September 29, 9:30 a. m.

Room 443, Fourth Floor

HEALTH SERVICE. Chairman, Dr. A. W. Colcord, Carnegie Steel Company, Clairton, Pa. Vice Chairman, Dr. Wm. A. Sawyer, Eastman Kodak Company, Rochester, N. Y. Secretary, Dr. A. J. Lanza.

Joint Meeting of Health Service Section with American Association of Industrial Physicians and Surgeons.

American Association of Industrial Physicians and Surgeons.—President, Dr. C. E. Ford, General Chemical Company, New York City. First Vice President, Dr. C. F. N. Schram, Fairbanks, Morse & Company, Beloit, Wisconsin. Second Vice President, Dr. L. A. Shoudy, Bethlehem Steel Company, Bethlehem, Pa. Secretary-Treasurer, Dr. W. A. Sawyer, Eastman Kodak Company, Rochester, N. Y.

Reports of Chairman, Secretary, Committees. Appointment of Nominating Committee.

Addresses:

Adequate Records of Lost Time in Industry Due to Disease.—Bernard J. Newman, Managing Director, Philadelphia Housing Association, Philadelphia.

The Problem of Heart Disease in the Industrial Worker.—Dr. Paul White, Massachusetts General Hospital, Boston.

Infection of Industrial Injuries.—Dr. Frederick J. Cotton, Boston.

Thursday, September 29, 9:30 a. m.

Room 448, Fourth Floor

MINING.—Third Session.

Maintaining Interest in Safety—

Among Executives.—W. H. Moulton, Superintendent, and Wm. Connibear, Safety Engineer, Cleveland Cliffs Iron Company, Ishpeming, Mich.

Among Foremen and Shift Bosses.—Thos. Copperswaite, Safety Engineer, Calumet and Arizona Mining Co., Bisbee, Ariz.

Among Miners.—J. T. Bradley, Safety Engineer, W. J. Rainey, Inc., Uniontown, Pa.

Observations of a Safety Engineer in Various Coal and Metal Mining Camps of the United States.—C. L. Colburn, Mining Engineer, U. S. Bureau of Mines, Co-operating with Mining Section of the National Safety Council.

Thursday, September 29, 9:30 a. m.

Room 429, Fourth Floor

PUBLIC SAFETY.—Second Session.

Report of Committee on Standardization.—L. A. DeBlois, E. I. du Pont de Nemours & Company, Wilmington, Del.

Report of Committee on Traffic Hazards.—L. J. Smyth, Director, Kansas City Division, National Safety Council, Kansas City, Mo.

Report of Committee on Public Utilities.—Herman Spoehrer, Union Electric Light and Power Co., St. Louis.

Report of Motion Picture Committee.—David S. Beyer, Vice President and Chief Engineer, Liberty Mutual Insurance Company, Boston.

Report of Committee on Pedestrian Hazards.—Dr. C. H. Kohler, Various Industries, Minneapolis, Minn.

Thursday, September 29, 9:30 a. m.

Room 436, Fourth Floor

STEAM RAILROAD.—Third Session. Joint Meeting of Railroad Section and Electric Railway Section. Chairman, John T. Broderick, Superintendent, Safety Department, Baltimore & Ohio Railroad, Baltimore.

Round Table Discussion: Highway Grade Crossing Accidents—

Suggested Topics for Discussion.

Bells and Locomotive Whistles as Effective Warning Devices.—J. E. Long, Superintendent of Safety, Delaware and Hudson Railroad, Albany, N. Y. (Invited.)

Gates, Distant Signs and Crossing Watchmen as Protection at Highway Grade Crossings.—F. M. Metcalfe, Assistant to General Manager, Northern Pacific Railroad, St. Paul, Minn.

The Value of Public Bulletins as Preventive Measures.—T. P. Brennan, Safety Agent, Long Island Railroad, New York City.

Bumps or Causeways at Crossing Approaches as Deterrents to Speeders.—F. Whittemore, Superintendent of Safety, Nashville, Chattanooga & St. Louis Railroad, Nashville, Tenn. (Invited).

Safety at Highway Crossings through Legislation.—Arthur Ridgeway, Safety Officer, Denver and Rio Grande Railway, Denver, Colo.

General Discussion.

Address: What is on My Mind.—D. L. Cease, Editor and Manager, "The Railroad Trainman," Cleveland.

Response: L. F. Shedd, Superintendent of Safety, Chicago, Rock Island and Pacific Railroad, Chicago.

Thursday Evening, September 29

SHORE DINNER FOR DELEGATES. A treat in the form of a good, old-fashioned New England shore dinner is in store for delegates and visitors attending the Congress. Chartered boats will take the crowd on the beautiful trip down the harbor to Nantasket Beach, an hour's ride. An excellent program of entertainment has been arranged. There will also be opportunity for dancing.

FIFTH DAY

Friday, September 30, 9:30 a. m.

Room 446, Fourth Floor

AUTOMOTIVE.—Third Session.

Report of Nominating Committee.

Addresses:

Industrial Surgery and First Aid.—Dr. T. A. McCann, Dayton Engineering Laboratories, Dayton, Ohio.

Safety Education through Motion Pictures (illustrated).—David S. Beyer, Vice President and Chief Engineer, Liberty Mutual Insurance Company, Boston.

Standardization of Statistics.—Geo. H. Hawes, Michigan Mutual Liability Co., Detroit.

Friday, September 30, 9:30 a. m.

Room 443, Fourth Floor

HEALTH SERVICE.—Second Session.

Report of Nominating Committee.

Addresses:

Transportation of the Injured (illustrated with slides).—Dr. R. R. Sayers, Chief Surgeon, U. S. Bureau of Mines, Washington, D. C.

The Baby Clinic in an Industrial Community.—Dr. Amelia A. Dranga, Pittsburgh.

Injuries and Diseases Giving Symptoms Especially Referable to the Lumbar Spine.—Dr. C. L. Bradford, Pittsburgh.

Friday, September 30, 2 p. m.

Room 443, Fourth Floor

HEALTH SERVICE.—Third Session.

Discussion of the Harm Done by Dusts in the Air (with demonstration of new apparatus for estimating atmospheric dust).—Drs. Cecil K. Drinker and Philip Drinker, Laboratories of Applied Physiology, Division of Industrial Hygiene, Harvard Medical School, Boston.

Friday, September 30, 9:30 a. m.

Room 448, Fourth Floor

MINING.—Fourth Session.

Report of Nominating Committee.

Addresses:

Mine Hygiene, Sanitation and Safety—

First Aid Stations Underground.—Dr. R. R. Sayers, Chief Surgeon, U. S. Bureau of Mines, Washington, D. C.

Provisions for Drinking Water.—B. C. Yates, Superintendent, Homestake Mining Company, Lead, S. D.

Latrines.

Underground Lunch Rooms.—Thos. Thomas, General Manager, Lehigh Valley Coal Company, Wilkes-Barre, Pa.

Traveling Ways and Signs.—R. H. Seip, Safety Engineer, New Jersey Zinc Co., Franklin, N. J.

Friday, September 30, 2 p. m.

Auditorium, First Floor

NEW ENGLAND CONFERENCE ON MOTOR TRAFFIC PROBLEMS. Chairman, Hon. John N. Cole, Massachusetts State Commissioner of Public Works.

Handling Traffic During Highway Construction.—

Paul O. Sargent, Chief Engineer, State Highway Department, Augusta, Maine.

Standardization of Motor Vehicle Accident Analysis.—Frank A. Goodwin, State Registrar of Motor Vehicles, Boston.

The Problem of Glaring Headlamps.—Prof. William J. Drisko, Massachusetts Institute of Technology, Boston.

Training Men for Traffic Duty.—Captain Bernard J. Hoppe, Head of Traffic Division, Boston Police Department, Boston.

Friday, September 30, 9:30 a. m.

Room 249, Second Floor

PACKERS AND TANNERS.—Third Session.

Report of Nominating Committee.

Addresses:

Actual Accident Experience and Its Relation to Insurance Rates.—W. B. Kinghorn, Supervising Inspector, The Travelers Indemnity Company, Hartford.

Occupational Hazards Incident to the Tanning Industry.

Health and Sanitation in Tanneries.—P. E. Pope, Manager, Labor Department, Pfister and Vogel Leather Company, Milwaukee.

Friday, September 30, 9:30 a. m.

Room 429, Fourth Floor

PUBLIC SAFETY.—Third Session.

Report of Vigilance Committee.—R. E. Lee, Automobile Manufacturers' and Dealers' Association, St. Louis.

Report of Publicity Committee.—Louis DeArmand, Commissioner of Public Safety, Davenport, Iowa.

Report of Committee on Home Hazards.—Mrs. E. Geo. Payne, St. Louis.

Report of Safe Drivers' Club Committee.—Carl L. Smith, Manager, Mississippi Valley Division, National Safety Council, St. Louis.

Report of Membership Committee.—C. M. Anderson, Manager, Safety and Sanitation Division, Milwaukee Association of Commerce, Milwaukee.

Report of Nominating Committee.

Friday, September 30, 9:30 a. m.

Room 431, Fourth Floor

RUBBER.—Third Session.

Reports of Committees:

Engineering, C. B. Mitchella, The B. F. Goodrich Company, Akron, Ohio.

Health Hazards, C. F. Horan, Hood Rubber Company, Watertown, Mass.

Membership, E. W. Beck, United States Tire Company, New York City.

Program, S. M. Schott, Morgan & Wright, Detroit.

Standards and Statistics, Ray N. Watson, Goodyear Tire and Rubber Company, Akron, Ohio.

Safety—From the Factory Manager's Viewpoint.—C. B. Whittelsey, President, Hartford Rubber Works, Hartford, Conn.

Reclaiming Plants and Their Efforts toward Safe Operation.—John C. W. Baker, Master Mechanic, Rubber Regenerating Company, Naugatuck, Conn.

Report of Nominating Committee.

Friday, September 30, 9:30 a. m.

Room 436, Fourth Floor

STEAM RAILROAD.—Fourth Session.

Addresses:

The Substitution of Superintendents' Staff Meetings for the Customary Safety Committee Meetings, as a Medium for Promoting Accident Prevention.—F. M. Metcalfe, Assistant to General Manager, Northern Pacific Railroad, St. Paul, Minn.

Discussion by D. G. Phillips, Superintendent of Safety, Wabash Railroad, St. Louis.

The Authority and Responsibility of the Safety Officer.—Harry A. Adams, Assistant to General Manager, Union Pacific Railroad, Omaha, Neb.

Discussion by F. H. Babcock, Safety Agent, Pittsburgh and Lake Erie Railroad, Pittsburgh.

Safety Control through Discipline.—E. R. Cott, Safety Agent, Hocking Valley Railroad, Columbus, Ohio.

General Discussion.

Report of Nominating Committee and Election of Officers.

Friday, September 30, 9:30 a. m.

Auditorium, First Floor

WOMEN'S MASS MEETING: SAFETY OF THE CHILD. Chairman, Mrs. George R. Fearing.

Safety Instruction in Public and Parochial Schools.—Dr. E. George Payne, Vice President, Education Section, National Safety Council.

How We Reduced Deaths among School Children Fifty Per Cent in One Year in Detroit.—Miss Harriet Beard, Supervising Instructor, Safety Education, Detroit Teachers College, Detroit.

Woman's Part in Accident Prevention.—Miss Ida M. Tarbell, New York City.

Friday, September 30, 9:30 a. m.

Room 370, Fourth Floor

WOODWORKING.—Third Session.

Report of Nominating Committee.

Addresses:

Guarding Woodworking Machines from the Viewpoint of the Operator.—George Orris, Organizer, United Brotherhood of Carpenters and Joiners, Indianapolis, Ind.

Laying out a Woodworking Plant for Safety and Efficiency.

Safety Code for Logging Operations—Construction, Operation, and Maintenance of Logging Railroads and Saw Mills.—J. M. Dickinson, Mechanical Engineer, United States Bureau of Standards, Washington, D. C.

Principal Causes of Eye Accidents

Cause	Total Number of Injuries	Per cent of Total	Total Number of Days Lost	Per cent of Total	Indemnity and Medical Aid	Days Lost per Injury	Cost per Injury
All causes*	589	100	169,393	100	$157,075	287	$267
Flying particles (Not otherwise classified)	203	34.5	59,174	34.8	$53,007	$291	261
Metal working machinery	112	19.0	10,270	6.1	12,274	91	109
Hot and corrosive substances	87	14.8	12,054	7.1	13,731	138	158
Hand tools	66	11.2	27,702	16.4	24,222	419	367
Striking against objects	57	9.7	24,235	14.3	20,649	425	362
Miscellaneous	43	7.3	17,607	10.4	14,802	409	344
Woodworking machinery	15	2.6	3,624	2.1	3,424	241	208
Clay, glass, and stone working machinery	3	.5	6,914	4.1	5,173	2,315	1,724
Explosives	3	.5	7,813	4.6	10,093	2,604	3,364

*State of Wisconsin. Accidents in 1919.

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

COLD STORAGE AND ICE PLANTS

December 2, 1919. Eaton, O. Florry Ice Company, S. Beech street. One 1-story building destroyed. Walls, wood. Floors, cement and earth. Roof, paper. Cause, unknown. Fire started, supposedly, near roof near elevator. Discovered by neighbor who saw light from bedroom at about 11 p. m. Alarm, telephone. Duration, 9 hours. Stopped at total loss. Fire was favored by paper roof and partitions. Private fire apparatus, none. Persons in building, none. Value of building and contents, $13,000. Property loss, $13,000.

December 11, 1919. Petersburg, Ill. H. M. Levering Ice Plant, E. Market street. One 2-story and one 1-story building destroyed. Walls, one building, brick; other, frame. Floors, cement. Roofs, rubber roofing. Cause, supposed incendiary. Fire started in frame building. Discovered by person on the street at about 11.05 p. m. Alarm, fire whistle. Duration, 2 hours. Confined to ice plant buildings. Firemen handicapped by fire hose cut in several places. Private fire apparatus, none. Persons in building, none. Value of building and contents, $35,000. Property loss, $35,000.

January 5, 1920. Toledo, O. Ohio-Toledo Ice Cream Company, 120 Nebraska avenue. Cold storage plant, vacant, undergoing repairs. One 3-story building destroyed. Walls, brick. Floors, wood. Roof, wood. Cause, explosion of gas which probably leaked during night and was ignited by workmen in morning. Fire started on first floor. Discovered by workmen about 6.55 a. m. Alarm, street box. Duration, 1½ hours. Stopped on premises. Fire was favored by wood partitions, floors and roof. Firemen handicapped by no windows above first floor. Private fire apparatus, none. Persons in building, 3. Killed, 2. Injured, none. Value of building and contents, $30,000. Property loss, $20,000.

January 10, 1920. Greenfield, Mo. Lee Brothers, College street. Lighting and ice plants. One 1-story building destroyed. Walls, galvanized iron (corrugated). Floors, cement. Roof, galvanized iron (corrugated). Cause, boiler few inches from wall. Fire started in boiler room. Discovered after building was aflame about 7 p. m. Alarm, fire alarm. Duration, about 3 hours. Stopped when plant burned down. Fire was retarded because of fire-resistive construction. Building was past saving when discovered; new men in charge of fire department. Private fire apparatus, only garden hose. Persons in building, 1. Killed, none. Injured, none. Means of escape, open doors on ground floor. Value of building and contents, estimated, $28,000. Property loss, $27,000.

January 16, 1920. East Syracuse, N. Y. New York Central's cold storage building, Center street and R. R. tracks. N. Y. C. coaling station. One 3-story building damaged. Walls, wood. Floors, wood. Roof, wood. Cause, short circuit in motor room. Fire started in motor room. Discovered by workman at about 1.05 p. m. Alarm turned in by local fireman. Duration, 9 hours. Stopped at west end of building. Fire was favored by construction of building as it was of Georgia pine. Firemen handicapped for water pressure, oil and coal, by late alarm, extreme cold, and strong wind. Private fire apparatus, N. Y. C. pumping engine. Persons in building, about 60. Killed, none. Injured, none. Means of escape, stairs outside. Value of building and contents not reported to SAFETY ENGINEERING. Property loss, $3,000.

February 4, 1920. Odgen, Ut. Denver & Rio Grande storehouse, West 21st street. Ice and store room. One 1½-story building partly destroyed. Walls, one half, double wall, inner filled with sawdust. Floors, one half, no floor; other half, common flooring. Roof, shingle. Cause, someone going into storeroom. Fire started at middle of building on inside. Discovered by switchman about ½ mile down the yard at about 9.04 p. m. Alarm, telephone. Duration, 1½ hours. Stopped at same building after roof and part of walls had burned. Fire was favored by open construction of building; it was open from floor to roof. Private fire apparatus, 1 hydrant and 1 line of 2½-inch hose. Persons in building, none. Means of escape, several doors. Value of building and contents, estimated at about $7,000. Property loss, estimated at about $5,000.

Febuary 17, 1920. St. Louis, Mo. American Manufacturing Company, 1021 South 10th street. Burlap factory and warehouse. One 1-

story building destroyed. Walls, brick. Floors, wood. Roof, composition. Cause, spontaneous combustion. Fire started in center of building. Discovered by employe at about 10.38 a. m. Alarm, sprinkler alarm followed by street box. Duration, 6 hours. Confined to building. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, 10. Killed, 2. Injured, 2. Value of building and contents, $163,146. Property loss, $155,000.

March 27, 1920. Beaumont, Tex. Stedman Fruit Company, Pine and Teris streets. Cold storage, etc. One 2-story building damaged. Walls, brick. Floors, wood. Roof, tar and gravel. Cause, incendiary. Fire started on second floor in warehouse. Discovered from apartment next door at about 7.15 p. m. Alarm, telephone. Duration, 2 hours, 50 minutes. Stopped at place of origin. Fire was favored by no fire stops, open construction, skylight and broken windows. Firemen handicapped by high potential wires in front of windows in front, bars in rear; automobiles hindered laying of second lines. Private fire apparatus, none. Persons in building, none. Means of escape, stairway inside. Value of building and contents, $190,000. Property loss, $40,000.

April 18, 1920. Troy, N. Y. Cooper's Ice House, Turner street. Two 3-story houses and a barn. Walls, all wood. Floors, sawdust. Roofs, tar and wood. Cause, unknown. Fire started in rear. Discovered by passerby at about 6.26 p. m. Alarm, box. Duration, 7 hours. Stopped at second floor. Fire was favored by wooden construction of buildings and straw and sawdust contents. Private apparatus, none. Persons in building, none. Means of escape, none. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

April 18, 1921. Fresno, Cal. San Joaquin Ice Company, Santa Clara and P streets. Ice manufacture and storage. One 2-story building damaged. Walls, frame. Floors, wood. Roof, shingle. Cause, unknown. Fire started in attic over offices. Discovered by employe at about 9.48 a. m. Alarm, telephone. Duration, 8 hours. Confined to building. Fire was favored by roof space and large area. Firemen handicapped by explosion of ammonia drums. Private fire apparatus, none. Persons in building, 4. Killed, none. Injured, none. Means of escape, good. Value of building and contents, $90,000. Property loss, $72,000.

May 21, 1920. Spokane, Wash. Northern Pacific Ice Company, between Sheridan and Grant streets. Ice houses. One 1-story building destroyed and another damaged. Walls, one building, stone; other, wood. Roofs, wood. Cause, gasoline explosion. Fire started at side of frame building. Discovered by workman at about 8.50 a. m. Alarm, employe of city crematory department, 2 blocks away, telephoned in alarm after fire had good start. Duration, 10 hours. Confined to ice houses. Fire was retarded by stone walls of second building. Private fire apparatus, none. Value of building and contents, $36,000. Property loss, $5,200.

June 28, 1920. Lake Kegonsa, Wis. Martin Green's Icehouse, Camp Dewey (summer resort). Grocery. Three 1-story buildings destroyed. Walls, wood. Floors, wood. Roof, shingle and paper. Cause, cigar in ice house. Fire started in ice house. Discovered by party after ice at about 3 p. m. Alarm, telephone. Duration, 2 hours. Stopped at small cottage close to ice house. Fire was favored by wooden construction and spread by proximity of buildings. Firemen handicapped by lack of facilities, 4 miles distance to fire, and strong wind. Private fire apparatus, buckets near lake; fire truck not equipped with pump. Persons in building, 10. Killed, none. Injured, none. Means of escape, doors and windows. Value of building and contents, $3,500. Property loss, $3,500.

August 2, 1920. Westford, Mass. Lowell's Ice Supply, Forge Village. Seven 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, incendiary. Fire started in scaffolding. Discovered by passerby at about 5.45. Alarm, telephone and electric whistle. Duration, 6 weeks. Stopped at pond. Fire was favored by sawdust between walls which with heat formed a combustible gas. Firemen handicapped by distance of 900 feet to nearest hydrant. Private fire apparatus, none. Persons in building, none. Value of building and contents, $116,000. Property loss, $116,000.

January 26, 1921. West Shreveport, La. Shreveport Ice & Brewing Company, Western avenue. Cold storage plant. Two 1-story buildings damaged. Walls, brick. Floors, cork. Cause, overturned pot of boiling tar. Discovered by workmen at about 11.40 a. m. Alarm, telephone. Duration, 1 hour, 40 minutes. Fire was spread by tar on floor and walls. Brick storage house was under repairs and scaffolding in it caught fire through large doorway. Firemen handicapped by long leads of hose. Private fire apparatus, none. Value of building and contents, $750,000. Property loss, $40,000.

COAL AND LUMBER YARDS

November 15, 1919. Portland, Ore. Willamette Box & Lumber Company, 1st street, Linnton. Box factory. One 1-story building destroyed. Walls, frame. Floors, frame. Roof, frame and metal. Cause, defective boiler inclosure. Fire started in boiler inclosure. Discovered by watchman at about 2.09 a. m. Alarm, telephone. Duration, 2 hours. Stopped when plant was destroyed. Fire was favored by light frame construction of building. Firemen handicapped by distance of 5 miles to fire. Private fire apparatus, none. Persons in building, none. Killed, none. Injured, 1 (fireman). Value of building and contents not reported to SAFETY ENGINEERING. Property loss, $15,500.

November 17, 1919. Bridgeport, O. Scott Lumber Company, Lincoln avenue. One 2-story building damaged; windows were also broken in a dwelling nearby. Walls, wood. Floors, wood and brick. Roofs, rubberoid. Cause, explosion. Fire started in engine room. Discovered immediately, at about 8.10 a. m. Alarm, telephone. Duration, 20 minutes. Confined to engine room. Fire was favored by wooden construction and contents of building. Private fire apparatus, chemicals and hose system. Persons in building, between 30 and 40. Killed, 1. Injured, 2; one of these seriously. Means of escape, none except stairway. Value of building and contents, $14,000. Property loss, $200.

December 8, 1919. Bridger, Mont. Bridger Coal & Improvement Company, ¼ mile west of city. Coal lands and equipment. One 1-story building destroyed. Walls, frame, Floors, boards. Roof, tar paper. Cause, supposed, coat hung near heating stove. Fire started in engineers' washroom. Discovered by inside helper at about 11 a. m. Duration, about one hour. Stopped at building of origin. Fire was retarded from spreading by isolation of building. Firemen handicapped by frozen-up fire plug. Private fire apparatus, water and hose only. Persons in building, 4. Killed, none. Injured, none (except minor burns). Means of escape, doors on 3 sides. Value of building and contents, approximately $40,000. Property loss, $40,000.

December 10, 1919. Victoria, B. C. Moore & Whittington, 2802 Pleasant street. Lumber and planing mill. One 2-story building (lumber-mill, dry-kiln, and boiler-shed under one roof) destroyed. Walls, wood, open at both ends. Floors, wood and flooring, mostly tar and gravel. Roof, corrugated iron sheeting. Cause, hot bearing on main-pulley. Fire started on lower floor of mill. Discovered by engineer and several mill-hands at about 2.40 p. m. Alarm, fire alarm box at front of office. Under control in about 90 minutes, but firemen worked nearly 2 days. Stopped at building of origin. Fire was favored by ends of building open to full sweep of wind. Firemen handicapped by heavy wind sweeping through building, and by frozen mill hydrants, entailing longer lines. Private fire apparatus, mill hydrants out of order; Leigh's mill, across the street, laid in a 2½-inch line. Persons in building, about 30. Killed, none. Injured, 2 (firemen). Value of building and contents, $50,000. Property loss, $40,000, including machinery to be salvaged later.

The mill originally was built on piles, but filled in with slab-wood and sawdust brought to floor level. The fire got down into this, requiring the firemen to be kept at the place for a long period.

The mill-hands attempted to put out the fire at its inception, but owing to the frozen hydrants it got out of their hands. If the fire-alarm box had been promptly used it is quite likely there wouldn't have been so heavy a loss.

December 13, 1919. Fairfield, Ia. Eclipse Lumber Company, North 4th and Yowe streets. Lumber yards. One 1-story building, 132 ft. sq., destroyed. Walls, wood. Floors, earth. Roof, rubberoid. Cause, unknown. Discovered by passerby at about 7.20 a. m. Alarm, telephone. Duration, 11 hours. Stopped when all lumber and building had burned. Fire was favored by wooden construction of building. Firemen delayed by train at crossing. Private fire apparatus, none. Persons in building, none. Value of building and contents, $100,000. Property loss, $7,000.

February 9, 1920. Stilwell, Kans. Blaker Lumber Company, Main street. Lumber yard. Two 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in back of yard. Discovered by a party in restaurant at about 10.30 p. m. Alarm, none. Duration, all night. Fire was favored by wooden construction and wood in buildings. Private fire apparatus, extinguishers. Persons in building, none. Value of building and contents, $18,000. Property loss, $6,000.

February 16, 1920. Billings, Mont. Russell Lumber Company, corner 22nd street and 1st avenue, North. Retail lumber yard; sash and doors. Four 1-story buildings destroyed, another damaged. Walls, frame. Floors, wood. Roofs, shingle. Cause, undetermined. Fire started in northwest corner. Discovered by nearby resident who saw reflection at about 4.50 a. m. Alarm, Gamewell street box. Duration, 13 hours. Confined to premises. Fire was favored by flammable construction and contents of buildings. Private fire apparatus, none. Persons in building, none. Value of building and contents, $40,000. Property loss, $31,000. Office records and stocks of cement and lime were saved.

May 5, 1920. Marshfield, Ore. Buehner Lumber Company, Waterfront road, North Bend. Boiler house of sawmill. One 2-story building destroyed. Walls, corrugated iron. Floors, lower, earth; upper, wood. Roof, corrugated iron on wood. Cause, gas explosion in fire-box. Fire started above boilers. Discovered by boiler tender going on duty at about 6.25 a. m. Alarm, telephone. Duration, about 1½ hours after discovery. Stopped at building of origin. Fire was retarded by iron construction of building, but favored by large amount of sawdust in building. Firemen from Marshfield handicapped by 3-mile run to fire, and trouble getting water until supply in North Bend reserve reservoir was turned into mains. North Bend Fire Department lacks equipment. Private fire apparatus, about 500 ft. of 2½-inch hose. Persons in building, 2. Killed, none. Injured, none. Means of escape, 3 doors downstairs, 1 door upstairs. Value of building and contents, $50,000. Property loss, $50,000.

March 17, 1920. Washington, D. C. W. T. Galligher & Brothers' Lumber Yard, N. W. corner 13th and B streets, N. W. One 2-story office building, and lumber sheds destroyed. Walls of office building, brick; of lumber sheds, frame. Floors, wood. Roofs, wood and

tin. Cause, overheated stove in office. Fire started in office on first floor. Discovered by night watchman at about 4.35 a. m. Alarm, through fire alarm headquarters from box. Duration, 16 hours, 25 minutes. Confined to office building, frame lumber sheds, and lumber. Fire was favored by frame lumber sheds and lumber stored in them. Private fire apparatus, none. Persons in building, none. Killed, none. Injured, 2 (members of fire department). Value of building and contents, $81,000. Property loss, $35,000.

May 7, 1920. Johnson City, Tenn. W. S. Whiting Lumber Company, Walnut and Watauga streets. Flooring and finished lumber. One 1-story and one 2-story building destroyed. Walls, wood sheeting covered with corrugated iron. Floors, wood. Roofs, tin. Cause, unknown. Fire started near center of mill. Discovered by motorcycle police at about 11.30 p. m. Alarm, police blew factory whistle. Duration, 8 hours. Confined to building of origin. Fire was favored by building full of dry lumber. Firemen handicapped by headway before discovery. Private fire apparatus, none. Persons in building, 2. Killed, none. Injured, none. Means of escape, doors and stairways. Value of building and contents, $150,000. Property loss, $150,000. Papers were protected by vault and saved intact.

May 23, 1920. Malden, Mass. Malden City Lumber Company, 976 Eastern avenue. Lumber yard. Two 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started near city house. Discovered by pedestrian at about 1.58 a. m. Alarms, box on fire alarm system. Duration, 8 hours. Confined to two buildings and some lumber. Fire was favored by wooden construction, lumber piled between buildings, and lack of fire walls. Private fire apparatus, none. Persons in building, none. Means of escape, none. Value of buildings, $93,000. Property loss, not reported.

May 31, 1920. Laflin, Pa. The Laflin Coal Breaker. One 1-story (125-ft.) building destroyed. Walls, wood. Floors, wood. Roof, slag. Cause, unknown. Fire started in wheel tower. Discovered by being seen from street at about 8.30. Alarm, gong. Duration, 6 hours. Stopped at ground. Fire-room, separate, saved. Fire was favored by wooden construction of building. Private fire apparatus, none. Persons in building, none. Value of building and contents, $250,000. Property loss, $250,000.

June 25, 1920. Los Angeles, Calif. Johnson-Wilcox Hardwood Lumber Company, 1965 S. Vermont avenue. Mill building. One 1-story building damaged. Walls, frame. Floors, wood. Roof, composition. Cause, spontaneous combustion. Fire started in mill. Discovered by employes at about 10.36 p. m. Alarm, box. Duration, 5 hours. Stopped inside property. Fire was favored by frame construction of building. Private fire apparatus, none. Persons in building, none. Means of escape, plenty of exits. Value of building and contents, $50,000. Property loss, $10,000.

June 28, 1920. Newton, Mass. Strangman Manufacturing Company, 34 Crafts street, rear. Lumber mill (building finish). One 2-story building destroyed. Walls, wood. Floors, wood. Roof, wood, covered with tar paper. Cause, overheated bearing. Discovered by workmen at about 1.33 a. m. Alarm, box. Duration, nearly 6 hours. Did not extend to other buildings. Fire was favored by all wooden construction. Private fire apparatus, none. Persons in building, about 20. Killed, none. Injured, none. Means of escape, doors and windows. Value of building and contents, $85,000. Property loss, $31,000.

July 6, 1920. Oconomowoc, Wis. Oconomowoc Lumber Company, S. Cross street. Lumber yards. Eight 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, composition and iron. Cause, unknown. Fire started in lumber shed. Discovered by passer-by at about 1.30 a. m. Alarm, telephone. Duration, 7½ hours. Fire was retarded by all surrounding buildings being built of brick or covered with iron. Private fire apparatus, none. Persons in building, none. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $70,612.

July 22, 1920. Manistee, Mich. Buckley & Douglas Lumber Company, 4th street. Saw mill and salt block. Four 2-story buildings destroyed and eleven 2-story buildings damaged. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in mill. Discovered by watchman at about 8.22 p. m. Alarm, mill whistle. Duration, 30 hours. Stopped across the street. Fire was favored by construction of buildings. Private fire apparatus, none. Persons in building, not reported. killed, none. Injured, none. Means of escape, windows. Value of building and contents, $100,000. Property loss, not reported.

July 23, 1920. Boston, Mass. N. Y., N. H. & Hartford R. R., Dover street yard. Coal pocket; conveying and storage of soft coal. One 3-story building damaged. Walls, wooden planks, joists. Floors, one wooden balcony, metal hoppers. Roof, fireproof shingles. Cause, spontaneous combustion of coal dust and oil from machinery. Fire started at conveyor at top of structure, southwest end. Discovered by employes at about 4.30 p. m. Alarm, city fire alarm system. Duration, 3 hours. Confined to roof. Fire was favored by coal, which being readily ignited, burned freely, combined with wooden structure. Firemen handicapped by long lines of hose. Private fire apparatus, intake hydrant connected by 6" pipe line under tracks with hydrant each end of coal pocket. Standpipe connected to high service. Persons in building, 4 or 5. Killed, none. Injured, 4 (firemen). Means of escape, stairway at each end. Value of building and contents, $30,000. Property loss, not reported.

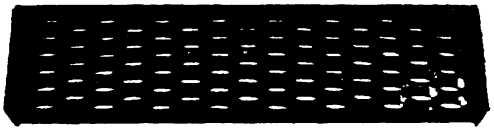
Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

UNIVERSAL COMPANY MAKES GRATINGS

Having received the official approval of the United States government in connection with negotiations for the sale of their gratings to certain vessels in the naval service, the Universal Safety Tread Company, 40 Court street, Boston, Mass., has perfected all arrangements and is ready to begin manufacturing at once its new safety grating for power-house floors, ship-hatchways and engine-rooms, sidewalks, platforms, and car-steps.

The new and interesting features of this product were recently examined at the office of the company by a representative of SAFETY ENGINEERING. So far as we know, this grating is the only one of the kind in which the use of rivets is entirely eliminated. The members are connected by tongues or flanges punched to fit into corresponding apertures and clamped by heavy pressure against the opposite side of the openings.



Owing to the fact that the openings are punched above the neutral axis, there is no loss of tensile strength by the weakening of members. The corresponding tongues or flanges fill the vertical openings, which are thus always in compression. By this form of attachment, the entire platform or step surface is firmly interlocked and held rigidly at all points of contact.

In gratings where there may be spans of varying lengths, transverse bars are spaced at suitable intervals directly under the mesh members and attached to the deeper outside frame members at front and back. These reinforcing members may be round rods or bars on edge, as may be required.

The practice of replacing ordinary floors and platforms in power plants and ladder-steps with open gratings, is becoming more and more popular among those who seriously consider questions of sanitation and ventilation. On the other hand, where the use to which a platform or floor is to be put is such that a solid surface is required, concrete floors in which such a grating has been imbedded are found to provide the very best armor against the wear of heavy trucking.

MOVING PICTURES IN SAFETY CAMPAIGNS WITH THE AMERICAN PROJECTOSCOPE

In order to meet the need for motion-picture educational work in the industrial fields it was necessary that a safe and practical machine be built. The demand for such a machine has been growing steadily for the past ten years. Soon after this demand was felt, the American Film Company, a pioneer in the motion picture industry, had presented to it a portable moving picture machine known as the American Projectoscope. The representatives of the company were so impressed with the merits of this machine that they decided to undertake its production. The outgrowth of this interest is the American Projecting Company and its factory.

Accuracy is the prime requisite in building moving picture equipment. The entire mechanism of the American Projecting Company's plants is manufactured within a tolerant of one ten-thousandth of an inch.

All parts of the American Projectoscope are made or assembled in the American Projecting Company plant. Only the best grade of material is used. The assembling is done by experts in each phase of the process. The maximum tolerant allowed on the working parts is one ten-thousandth of an inch. The assembling of these machines is as exact as that seen in the making of watches. The test for accuracy is as severe as the test given to the bearings of coast defense gun mountings. One of the tests of each machine is equivalent to the running of one hundred thousand feet of film. All parts are carefully inspected for flaws of material and workmanship.

The mechanism head—which contains the motor, motor-base, patented reversible snap switch, shutter, driving gears, star, cam, sprockets, framing mechanism, aperture, reel drive pulleys and the flywheel—is the most important part of the assembly. The motor is a universal high speed reversible type, built specially for the projectionist. The patented,

reversible, snap motor switch is simplicity itself, giving universal control from one key.

There are two film magazines, each having a separate door with the film entrance protected by patented roller snuffers which prevent any flame from reaching the interior. The reel shafts are mounted on ball-bearings. These features are unique with the American machine. The motor speed is regulated by a special rheostat which has an exceptionally simple exterior control.

The complete machine is assembled in a sturdy case, designed to allow the complete control in operating while closed. The case is made of seasoned, kiln dried wood, covered with fabrikoid, and bound and fitted at all points where wear will be experienced, with japanned brass and steel fittings. The interior is covered with a fireproof Egyptian lacquer. A durable leather handle is firmly secured to the case to facilitate in transportation.

The projecting lens is composed of two sets of compound lenses. These lenses can be obtained ground to different focal length which vary the projecting range from one to 60 feet. The lamp is mounted nine inches from the aperture, allowing the light to be cooled before reaching the film. A system of three condensing lens concentrates the full value of a two hundred and fifty watt nitrogen incandescent lamp. This lamp produces an extremely brilliant and whiter light than has heretofore been possible. The lamp housing is made of aluminum and is asbestos lined, and is designed to carry most of the heat off at the sides or out through the top.

An American Projectoscope in operation in a Michigan salt mine is a striking example of the possibilities inherent in moving picture education. A group of miners in a northern Michigan salt mine are given safety-first lessons projected on an American Projectoscope by, the Michigan Mutual Liability Company. The mine labor element of this country is among the most difficult groups to educate; the fact that a large Michigan mining company has adopted this method of education speaks well for it. Among other concerns utilizing the American Projectoscope and moving pictures are the Harley-Davidson Company, who used four machines in a sales campaign, the Armour Company, packers, who use a Projectoscope in their welfare work, and the Midwest Engine Company, who use it with moving pictures in selling the Midwest Utilitor.

Mr. Dudley, chief, Bureau of Visual Instruction, University of Wisconsin, thinks so well of the machine for educational use that he has personally placed many American Projectoscopes in Wisconsin. He recommends the machine because he considers the stop and reverse features indispensable for instruction work. An instructor may stop the machine and his film becomes a slide or still picture. This permits him to point out the things of interest without having to take a chance that the audience will see the points as he mentions them when the film is moving. Should one of the audience miss a point, it is necessary only to reverse the motor switch and go back over the picture, taking up the subject where it was missed. The same features are of practical value in teaching safe practices of machinery operation, electrical installation and safety work in all its phases.

STEEL SIGN PRICES REDUCED

The Stonehouse Steel Sign Company, 826-842 Larimer street, Denver, Col., has reduced prices which were in effect up to July 1 by a 20 per cent cut.

Labor conditions precluded making a reduction on 18 gauge steel signs in quantities over twelve.

This company publishes a comprehensive catalog and carries thousands of different accident-prevention signs in stock. The catalog is sent to any interested applicant on request.

NEW SAFETY EQUIPMENT FIRM ORGANIZED

The Standard Safety Equipment Company of 168 North Michigan Avenue, Chicago, has issued its initial catalog of safety, first-aid and welfare equipment and supplies. This catalog is unusally complete and comprehensive, comprising as it does practically everything from a suggestion box and protective wearing apparel to carboy carriers, drinking fountains, goggles and face masks.

The catalog is completely illustrated throughout.

This is the first catalog of the company, which has recently been organized. C. A. Kingsbury is president, G. M. Dickson vice-president, F. L. Hurlbutt treasurer, and L. E. Dickson secretary. The firm has a branch office, of which A. U. Barnes is manager, in the Clinton Building, Newark, N. J. An office is also maintained in Detroit at 414 West Grand River.

COMFORT GOGGLES

After a shop-to-shop investigation throughout the United States to find the cause of not wearing goggles to prevent eye-injuries, a man familiar with working conditions reported that the men's greatest objection to wearing the goggles provided by their employers was "because they were not comfortable."

The National Founders Association, Chicago, has received testimonials from workmen who supply their own goggles in order to have "decent" ones, and not be compelled to wear "some of those implements of torture handed out with those 'Be sure and wear your goggles' lectures." The choice of these men is the National Affiliated Safety Organizations' Comfort Goggles. The National Founders Association, jointly with the National Metal Trades Association and the National Association of Manufacturers, has issued a folder illustrating these goggles, which it claims are the most comfortable for the workman to wear, and are always found on his face instead of in his pocket.

GLAUBER BRASS EXPANDS

An eight-acre plant has recently been acquired by the Glauber Brass Manufacturing Company of Cleveland for the expansion of its business, now located at Superior avenue, N. E., and East 40th street. The new plant is at the corner of Platt avenue, S. E., East 79th street, and the Pennsylvania railroad. The Glauber Company, founded in 1889, is now said to be the largest manufacturer in the country of water works equipment, gas, steam, and plumbing goods.

SAFETY IN CARBOY HANDLING

The safe handling of acids shipped in carboys is a serious problem to engravers, photographers, fire departments, storage battery stations, industrial laboratories, chemical departments in schools and colleges, wholesale druggists, and scores of others.

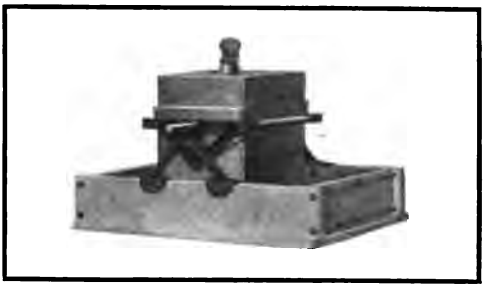
Nitric and sulphuric acids make very painful and dangerous burns when they come in contact with the flesh. Other acids and liquids handled in carboys give off poisonous fumes or extremely obnoxious odors. Some are highly explosive. Yet the carboy seems the only solution for shipping them in large volume. It is no easy matter to lift and pour from a young house with the nicety of a medicine dropper.

The difficulty seems to have been simply and efficiently solved by Mr. James Carey, of The Carey Company of Pittsburgh, in an invention devised as a solution of Mr. Carey's own troubles with carboys in a photo-engraving plant.

The device is a combined carrier, holder, inclinator and drainer. The carrier is adjustable to fit any carboy from 14 to 21¼ inches. The frame is of cast iron, requires scarcely more floor space than the carboy itself, and gives

rigid support for the carboy and carrier, which fits into it and stays automatically in upright position.

The company also has on the market a model mounted on a slate trough, which is acid proof, and altogether eliminates the danger of spilling acids by careless handling. Should a break or leak occur, the acid accumulates in the tank without offering any menace to the



life and safety of employes, or the plant and materials.

The handling of a carboy in the old manner is a real two-man job, and even then there is great risk and usually much waste of costly acids. With the Carey Inclinator one man does

the work of two and does it easily, quickly and accurately. The last drop is drained from the container as easily as the first, and the device appeals from the triple standpoint of saving in time, risk and material.

VALVES FOR BOILER AND STEAM LINE PROTECTION

Of the valves made by the Golden-Anderson Valve Specialty Company, Pittsburgh, Pa., the two hereinafter described are of special interest to power plant owners and engineers, in view of the efficiency, safety and economy they render.

It is claimed that the Double Extra Heavy Golden-Anderson Automatic Double Cushioned Triple-Acting Non-Return and "Plain" Non-Return valves are more indispensable in the power plant than safety valves, for the following reasons:

1. They prevent expensive shut-downs and loss of life and property due to ruptured boiler tubes, for valves close the instant a break occurs. The "Triple-Acting" design valves also close, automatically, the instant a steam line ruptures or there is bursting of a joint, cutting off further flow of steam from the boilers.

2. They absolutely protect men while inside of "dead" or cold boilers, and make backflow of live steam impossible.

3. They equalize the pressure between the boilers automatically.

4. The eliminate hand-operation, for they automatically cut in and out the boilers.

5. They make it impossible to cut in a boiler prematurely due to inaccurate steam gauges—valves cannot be opened by handwheel—unless desired specially so arranged.

6. They provide for every possible contingency; the "automatic" testing feature enables the valves to be tested from floor or remote points.

7. There are no springs in valves and no adjustments required.

8. They are double extra heavy throughout, built for economic and durable service and for the benefit of the users.

9. They are double cushioned by "Double Corliss" Dash Pots, the only arrangement which eliminates disastrous hammering, pounding or sticking, and makes valves virtually indestructible by service.

10. They were thoroughly tested by the United States Steel Corporation, in common with all the automatic valves in the country, covering a period of about three years. Merits won—this corporation has already purchased over 1,997 of the valves and is constantly placing orders for additional valves.

The inside dashpot is attached to a spindle, while the outside dash pot acts as a bronze cylinder and is held firmly in place by numerous tap bolts. When the steam pressure raises the valve the resulting space between the inner and outside dashpots is instantly filled with steam, and throroughly cushions the valve in closing. The steam also circulates around and above the inside dashpot through ports to cushion the valve in opening. This construction makes the valves virtually indestructible by reason of the perfect cushioning of the valve in opening and closing.

The small branch pipe shown may be run to the floor or any other convenient point or points for testing the valve in service. Simply by opening the small valve the non-return valve will instantly close. By closing the small valve the non-return valve will immediately return to its automatic position. This feature is very important in such valves and enables the operators to determine at any time whether the valve is operative to close, automatically, in case of accident; and it avoids going on top of boilers to test valve by the handwheel, which is no reliable and satisfactory test for any automatic valve that has to work itself.

The Triple Acting Non-Return valve requires only one connection to the header. The Automatic Pilot valve, which is weighted to about 8 lbs. between boiler and header pressure, supplies the differential on which the triple acting non-return valve will close, automatically, in case of bursted steam line or other such accident. In event of accident to the steam line which would immediately release the header pressure above the pilot valve piston, the initial boiler pressure underneath opens the pilot valve and allows the steam between the dashpots to exhaust. The initial boiler pressure through by-pass of the valve disc on top of the inside dashpot immediately closes the valve (owing to its greater area) and holds the valve closed until the break is repaired, as the small ball valve prevents return of steam throug valve disc.

DESIGNING SAFETY GUARDS

The need for adequate protection in many plants is fast developing a fuller appreciation of the advantages provided by the modern method of safety guarding. Machine guards, window guards, shop partitions and enclosures, are readily constructed of Steelcrete Expanded Metal. The illustration below shows some of the most used styles of machine guards built of this ideal material:

Steelcrete is a continuous expanded sheet which can be cut and formed into safety guards of any shape and size. This material is Underwriters' Tested and Inspected, and guards constructed of it can be built to conform to all of the various state laws and to meet any special requirements of local inspectors. With Steelcrete can be furnished all the accessories needed in guard-building. Safety, Angles, U-Edging, Floor Sockets, Splice Bars, Angle Frames and Clips, which simplify the construction, and provide strength throughout the guard. These accessories make it possible to install in one guard meshes of various sizes, and also to incorporate all desired doors and openings. Steelcrete Expanded Metal is stiff and rigid. It resists knocks and bangs. Its strength adapts it to long unsupported lengths.

The open mesh, with diamonds turned on edge, permits a full stream from a hose for fire fighting. And the open mesh also allows free ventilation, ample light, high visibility, and protection from theft. The safety guard or the enclosure constructed of Steelcrete is sightly, and can be painted or enameled as de-

sired. It means the highest type of protection at low cost.

A booklet has been issued, entitled "The Machine Guard Handbook," containing useful information pertaining to guards and mesh partitions. A copy may be had by addressing The Consolidated Expanded Metal Companies, Braddock, Pennsylvania.

UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

ACETYLENE GENERATOR—Modern Engineering Co., Mfr., 23d and Walnut Sts., St. Louis, Mo.

ACETYLENE GENERATOR—Standard Marvel Co., Submittor, Salamanca, N. Y.

ANTI-SLIP TREADS—American Mason Safety Tread Co., Mfr., Lowell, Mass.

ARMORED CABLE—Bourn & Co., S. W., Submittor, 58 Waldo St., Providence, R. I.

ARMORED CABLE—Pollack Conduit Co., Inc., Mfr., 467 Greenwich St., New York, N. Y.

AUTOMATIC SPRINKLER—Reliable Automatic Sprinkler Co. Mfr., 292 Avenue B, New York, N. Y.

AUTOMATIC SWITCHES—CLOCK-OPERATED TYPE—A. & A. Mfg. Co., Mfr., 644 Manhattan Ave., Brooklyn, N. Y.

AUTOMATIC SWITCHES — MAGNETICALLY OPERATED TYPE—General Electric Co., Mfr., Schenectady, N. Y.

BELLS—Edwards & Co., Inc., Mfr., 140th & Exterior Sts., New York, N. Y.

BOXES—COMBINED WATCH AND FIRE ALARM—American District Telegraph Co., Submittor, 30 Church St., New York, N. Y.

CABINETS AND CUTOUT BOXES—SHEET METAL—Globe Sheet Metal Mfg. Co., Mfr., 854-856 Howard St., San Francisco, Calif.

CABINETS AND CUTOUT BOXES—SHEET METAL—Mansfield Electric Hardware Co., Mfr., Mansfield, Ohio.

CABINETS AND CUTOUT BOXES—SHEET METAL—Michigan Stamping Co., Mfr., Detroit, Mich.

CABINETS AND CUTOUT BOXES—WEATHERPROOF—Casper, Albert, Mfr., Vallejo, Calif.

CABINETS AND CUTOUT BOXES—WEATHERPROOF—Trumbull Electric Mfg. Co., The, Mfr., Plainville, Conn.

CARTRIDGE ENCLOSED FUSES—NON-RENEWABLE—Kirkman Engineering Corp., Mfr., 484 Broome St., New York, N. Y.

CARTRIDGE ENCLOSED FUSES—RENEWABLE TYPE—D & W Fuse Works of General Electric Co., Submittor, Providence, R. I.

CARTRIDGE ENCLOSED FUSES—RENEWABLE TYPE—General Electric Co., Mfr., Schenectady, N. Y.

CENTRAL STATION TIME RECORDER—American District Telegraph Co., Submittor, 30 Church St., New York, N. Y.

CHEMICAL EXTINGUISHER, 1½ QT. PUMP TYPE—Boyce & Veeder Co., Inc., Submittor, Long Island City, N. Y.

CHEMICAL EXTINGUISHER, 2½ GAL. LOOSE STOPPLE TYPE—Childs Co., O. J., Mfr., Utica, N. Y.

CHEMICAL EXTINGUISHER, 2½ GAL. LOOSE STOPPLE TYPE—Safety Fire Extinguisher Co., The, Submittor, 291-293 Seventh Ave., New York, N. Y.

CONDUIT BOXES—Federal Electric & Mfg. Co., The, Mfr., P. O. Box 1406, Pittsburgh, Pa.

CONDUIT BOXES—Oliver Electric & Mfg. Co., Mfr. 4221-27 Forest Park Blvd., St. Louis, Mo.

COUNTERBALANCED METAL-CLAD ELEVATOR DOOR—Security Fire Door Co., Mfr., 815-17 S. 14th St., St. Louis, Mo.

ENCLOSED SWITCH—All-Steel Equip. Co., Mfr., Aurora, Ill.

ENCLOSED SWITCHES—Leonard Elec. Mfg. Co., The., Mfr., 3907 Perkins Ave., Cleveland, Ohio.

ENCLOSED SWITCHES—Metropolitan Device Corp., Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

ENCLOSED SWITCHES—Trumbull Electric Mfg. Co., The, Mfr., Plainville, Conn.

ENCLOSED SWITCHES—Westinghouse Electric & Mfg. Co., Mfr., Brooklyn, N. Y.

FIRE BUCKET TANK—Safety Fire Extinguisher Co., The, Submittor, 291 Seventh Ave., New York, N.Y.

FITTINGS FOR CONDUIT BOXES—SUPPORTS—Alvin Electrical Products Co., Mfr., 211 Holden Bldg., Detroit, Mich.

FIXTURE FITTINGS—Butler Electric Co., 3531 Cottage Grove Ave., Chicago, Ill.

FIXTURE FITTINGS—Chicago Electric Products Co., Mfr., 4605 Ravenswood Ave., Chicago, Ill.

FIXTURE FITTINGS—Connolly Electric Co., Mfr., 858 N. State St., Chicago, Ill.

FIXTURE FITTINGS—Electrical Dealers Supply House, Mfr., 162 W. Randolph St., Chicago, Ill.

FIXTURE FITTINGS—Hyman & Co., Inc., Henry, Mfr., 476 Broadway, New York, N. Y.

FIXTURE FITTINGS—Johnsen Co., The, Arthur, Mfr., 4802 Fullerton Ave., Chicago, Ill.

FIXTURE FITTINGS—Peerless Light Co., Mfr., 663 W. Washington Blvd., Chicago, Ill.

FIXTURE FITTINGS—Sprecher Mfg. Co., P. W., Mfr., 3220 North Ave. Milwaukee, Wis.

FIXTURE SWITCHES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

FIXTURE SWITCHES—Weber Electric Co., Mfr., Schenectady, N. Y.

FIXTURES—Bullock Mfg. Co., Mfr., 408 W. 13th St., New York, N. Y.

FIXTURES—McPhilben Lighting Fixture Co., Mfr., 264 Fulton St., Jamaica, N. Y.

FLEXIBLE STEEL CONDUIT—Canadian Triangle Conduit Co., Ltd., Mfr., 21 Prescott Ave., Toronto, Ont.

FLEXIBLE STEEL CONDUIT—National Metal Molding Co., Mfr., Fulton Bldg., Pittsburgh, Pa.

FLEXIBLE TUBING FASTENERS—Renlim Mfg. Co., The. Mfr., 1240 Ontario St., Cleveland, O.

FLOOR OUTLET BOXES—Westinghouse Electric & Mfg. Co., Mfr., East Pittsburgh, Pa.

FUSELESS ATTACHMENT PLUGS—Hubbell, Inc., Harvey, Mfr. Bridgeport, Conn.

GROUND CLAMPS—Consolidated Electric Mfg. Co., Inc., Mfr., 223 North 13th St., Philadelphia, Pa.

GYPSUM TILE BLOCKS—American Cement Plaster Co., Mfr., Buffalo, N. Y.

GYPSUM BLOCKS, ANCHOR—American Gypsum Co., Mfr., Port Huron, O. (Factory, Port Clinton, O.)

GYPSUM TILE BLOCKS—Bell Co., H. W., Mfr., Park Ave. and 39th St., New York, N. Y.

GYPSUM BLOCKS—Plymouth Gypsum Co., Mfr., Fort Dodge, Ia.

HANGERS, LAMP AND FIXTURE—Cutter Co., George, Mfr., South Bend, Ind.

HANGERS, LAMP AND FIXTURE—Thompson Electric Co., The, Mfr., 226 St. Clair Ave., N. E., Cleveland, Ohio.

HARDWARE—SLIDING PATTERN — Menges Mfg. Co., Mfr., 2308 Randolph St., St. Louis, Mo.

HOLLOW METAL FIRE WINDOW FRAMES—Voightmann & Co., Mfr., 459 W. Erie St., Chicago, Ill.

HOLLOW METAL FIRE WINDOW FRAMES—Zeller Co., Wm. F., Inc., Mfr., 1119 Denver St., Baltimore, Md.

INSIDE HAND-OPERATED DISCHARGE DEVICES—Dayton Pump & Mfg. Co., The, Mfr., Dayton, O.

INSIDE HAND-OPERATED DISCHARGE DEVICE—Tokheim Oil Tank & Pump Co., Mfr., Fort Wayne, Ind.

INSULATING MATERIALS—Formica Insulation Co., The, Mfr., 4614 Spring Grove Ave., Cincinnati, O.

INTERNAL COMBUSTION ENGINE, ELECTRIC PLANT—Kohler Co., Mfr., Kohler, Wis.

INTERNAL COMBUSTION ENGINE, ELECTRIC PLANT—Lalley Light Corp., Mfr., Detroit, Mich.

LIQUID HEATING APPLIANCES—Aqua Electric Heater Co., The, Mfr., 250 West 54th St., New York, N. Y.

MEDIUM BASE RECEPTACLES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

METER MOUNTING—Electric Motor & Engineering Co., The, Mfr., Canton, O.

MOTION PICTURE MACHINE FOR USE WITH FIREPROOF BOOTHS—Acme Motion Picture Projector Co., Mfr., 327 S. LaSalle St., Chicago, Ill.

MOTION PICTURE MACHINES FOR USE WITHOUT FIREPROOF BOOTHS—American Projecting Co., 6231 Broadway, Chicago, Ill.

MOTION PICTURE MACHINES FOR USE WITHOUT FIREPROOF BOOTHS—Picturola Corp., Mfr., First National Bank Bldg., Chicago, Ill.

MOTION PICTURE MACHINE APPLIANCE—FILM PROTECTOR—Granville & Koch, Submittor, Box 176, Scranton, Pa.

OUTSIDE HAND-OPERATED DISCHARGE DEVICES—Tokheim Oil Tank & Pump Co., Mfr., Fort Wayne, Ind.

OUTSIDE POWER-OPERATED DISCHARGE DEVICE—Visible Pump Co., Inc., The, Submittor, Fort Wayne, Ind.

PANELBOARDS—Large-Dail Mfg. Co., Mfr., 606 Cherry St., Philadelphia, Pa.

PANELBOARDS—Scannevin & Potter, Mfr., 250 Thames St., Newport, R. I.

PANELBOARDS—Westinghouse Elec. & Mfg. Co., Mfr., 3rd and Elm Sts., Cincinnati, O.

PENDANT SWITCHES—Weber Electric Co., Mfr., Schenectady, N. Y.

PLUG FUSES—Chicago Fuse Mfg. Co., Mfr., 1501 W. 15th St., Chicago, Ill.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Bryant Electric Co., The, Bridgeport, Conn.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Oliver Electric & Mfg. Co., Mfr., 4221 Forest Park Blvd., St. Louis, Mo.

ROOF COVERINGS, CLASS C PREPARED—Wilberite Roofing Co., The, Mfr., State & Brook Pk. Rds., Cleveland, Ohio.

ROOF COVERINGS, CLASS C SHINGLE—Fibrated Products Corp., Mfr., 138 N. La Salle St., Chicago, Ill.

SAFES (CLASS B)—Art Metal Construction Co., Jamestown, N. Y.

SAFES (CLASS B)—Metal Office Furniture Co., Mfr., Grand Rapids, Mich.

SAFES (CLASS B)—Schwab Safe Co., The, Mfr., La Fayette, Ind.

SAFES (CLASS B)—Van Dorn Iron Wks., The, Submittor, Cleveland, O.

SHEETMETAL FIRE WINDOW MULLIONS—Perry & Christenson, Mfr., 229 Tenth St., San Diego, Calif.

SIGNS—Federal Electric Co., Mfr., 2718 Elliott Ave., Seattle, Wash.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Brodie & Son, J., Mfr., 1329 E. Fort St., Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Carrier Construction Co., Mfr., Miller St. and Ave. A., Newark, N. J.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Metropolitan Kalamein Sash & Door Co., Inc., Mfr., Junius St. and Livonia Ave., Brooklyn, N. Y.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Weisfeld Fire Door Wks., Inc., H., Mfr., 379 Jefferson St., Brooklyn, N. Y.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Western Steel Products Co., Mfr., New Duluth, Minn.

SLIDING AND SWINGING, SHEET-METAL FIRE WALL DOOR—Richards-Wilcox Mfg. Co., Mfr., Aurora, Ill.

STANDARDIZATION TOOL SET FOR THREADING AND GAUGING FIRE HOSE COUPLINGS AND FITTINGS—Greenfield Tap & Die Corp., Mfr., Greenfield, Mass.

SURFACE SNAP SWITCH SUB-BASES—Pass & Seymour, Inc., Mfr., Solvay, N. Y.

SURFACE SWITCHES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

SURFACE SWITCHES—Hart Mfg. Co., The, Mfr., Hartford, Conn.

SWEEPING COMPOUND—Stewart Co., The, Geo. A., Mfr., Sherman, Tex.

SWINGING, SHEET METAL STOREROOM DOOR—Variety Fire Door Co., Mfr., Carroll and Sacramento Aves., Chicago, Ill.

SWITCH BOXES—Cleveland Electrical Supply Co., The, Mfr., 220-22 High Ave., Cleveland, O.

SWITCH BOXES—Federal Electric & Mfg. Co., The, Mfr., P. O. Box 1406, Pittsburgh, Pa.

SWITCH BOXES—Hart Mfg. Co., The, Mfr., Hartford, Conn.

TRANSFORMERS, BELL-RINGING — Standard Transformer Co., The., Mfr., Warren, Ohio.

TWO-WHEELED 33-GAL. MANUALLY OPERATED STOPPLE INVERTING TYPE CHEMICAL FIRE ENGINE—Badger Fire Extinguisher Co., Inc., Mfr., Boston, Mass.

TWO-WHEELED 33-GAL. LOOSE-STOPPLE AND MANUALLY OPERATED STOPPLE INVERTING TYPE CHEMICAL FIRE ENGINE—O. J. Childs Co., Inc., Utica, N. Y.

UNDERGROUND STORAGE TANKS — Brown Sheet Iron & Steel Co., Mfr., 964-1000 Berry Ave., St. Paul, Minn.

UNDERGROUND STORAGE TANKS—Dayton Pump & Mfg. Co., The, Mfr., Dayton, O.

UNDERGROUND STORAGE TANKS — Holan Metal Products Co., The, Mfr., 4001 Clark Ave., Cleveland, O.

UNDERGROUND STORAGE TANKS — Metal Barrel Corp., Mfr., Peoria, Ill.

UNDERGROUND STORAGE TANKS—Western Steel Products Co., New Duluth, Minn.

UNDERGROUND STORAGE TANKS—New York Central Iron Wks. Co., Inc., Mfr., Hagerstown, Md.

UNDERGROUND STORAGE TANKS—Saracco Co., P., Mfr., 565 Bryant St., San Francisco, Cal.

UNDERGROUND STORAGE TANKS—Sharpsville Boiler Wks. Co., Mfr., Sharpsville, Pa.

UNDERGROUND STORAGE TANKS—Struthers-Wells Co., Mfr., Warren, Pa.

UNDERGROUND STORAGE TANKS—Whiting Welding & Tank Works, Mfr., Schrage Ave, and 119th St., Whiting, Ind.

VENTILATING TRANSOM—Ventilouvre Co., Inc., Mfr., First National Bank Bldg., Bridgeport, Conn.

WELDING BLOWPIPES—Bertschy Engineering Co., Mfr., Cedar Rapids, Iowa.

WIRES—SLOW-BURNING—York Insulated Wire Works of General Electric Co., Mfr., 1737 Broadway, New York, N. Y.

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Lila Lee Shows How 23,000 Persons Were Killed in Past Five Years

Photo from Underwood & Underwood, N. Y.

"Never use gasoline inside the house for cleansing purposes." See page 194.

Home Building and Fire Hazards
Some Facts and an Analysis

By Charles E. Worthington
Wellesley Hills, Massachusetts

IN the matter of hazard from fire the homes of the people rank very high in comparative immunity, in fact the highest, if we make three reservations: (1) the smaller dwellings costing at today's prices less than $1,500, as a rule of light and insufficient construction, lacking in safeguards and of such little endurance that they may fairly be called temporary; (2) the houses of the rich, costing $25,000 and upwards, where care and supervision instead of being directly exercised by the owner are relegated to servants or employes; and (3) a limited number of factories of light inherent hazard, of completely fire-resistive construction elaborately equipped and supplied with the best of modern fire-preventive and extinguishing devices.

"The Specially Vulnerable Points Contributing to the Spread of Fire Are Three: Combustible Roofs, Combustible Walls and Wooden Cornices or Facings Under Eaves, in the Order Named."

"Combustible Roofs Easily Take First Place as Fire Disseminators, Being Virtually Long Distance Systems of Transmission. Such a Roof in Close Proximity Is Less Dangerous Than One at a Moderate Distance."

"The Difference in Cost Between Shingles and Resistive Roofings Is Not Great."

In this, what ought to be and what is fall in coincident lines, for the home is the structure to the safety and shelter of which men entrust the lives of themselves and their families, and which, moreover, in the case of the average home owner, represents a large part of his possessions.

There are, it is estimated, something like 6,000,000 individual homes in the United States, owned and occupied by 6,000,000 American families, not tenements shared with others. (Whether bluntly called by their true name or sought to be camouflaged under high sounding titles calculated to soothe the sensibilities of their occupants, as apartments, chambers or family hotels, tenements or even rented dwellings, while giving shelter, seldom take on the full character of homes.)

Commenting upon the number of homes above quoted one leading metropolitan journal recently remarked editorially: "There is even more than ownership in this showing. There is permanency of settlement, frugality and economy of living, loyalty to neighborhoods, contentment of employment and confidence in the future... 'Own your own home' is more than a slogan, it stands for independence and real citizenship." To which may be added, such ownership conduces to a sense of personal and civic responsibility hardly to be acquired otherwise, building up a foundation of character, affording poor soil for the propagation of "moral and political hazards."

Whether the fact that approximately one-third of the whole population live in their own homes appeals merely as an indication of national prosperity or whether the proportion is greater or less than in other civilized countries, the fact remains that the proportion is by far too small and every effort should be put forth to increase it.

Floating population is comparatively irresponsible and in general character affords poor soil for the growth of national traditions and aspirations. Enlightened Governments look with apprehension upon its increase, regarding it and the undue accumulation of wealth in

individual hands as twin menaces, and strive, as far as Government influence may go, to favor small holdings and diffusion of wealth, particularly land ownership, in small parcels, placing stress upon the evil tendencies consequent upon the increase of tenements and slums in cities, and tenant farming in the rural districts. In this, Great Britain goes so far as to liberally subsidize individual home construction for the average citizen in recognition of its exceeding importance.

There is perhaps no one question of social economics that covers such a wide and varied range, so much so that at every turn, some new point of view distracts or tempts afield toward unrelated discussion, but to no nation more than to dollar-worshiping, amusement-mad America is the solution important or seemingly difficult to attain.

It is but a single aspect we consider here, and that only by conceding the national importance of diffusion rather than concentration of wealth, especially as regards land holdings.

Such concession seems easy to make when we call to mind the rapid deterioration in fertility of tenant-operated farms and the comparative national irresponsibility arising from an excess of floating population without fixed local interests. Not that floating population is avoidable, but that its excess beyond certain limits has evil tendencies.

An ideal nation, composed entirely of home owners, is manifestly impossible under present conditions. Yet if we eliminate that class, if only to the point of depriving it of the "balance of power," there loom at once twin specters of oligarchy and revolution, despite which there is constant pressure in the direction of such elimination.

Moral hazard as affecting fire loss proceeds from the individual groups outward; it is, to a large extent at least, determined by home conditions. No stream rises higher than its source.

"Moral hazard" however does not imply of necessity any immoral or unmoral act or mental attitude on the part of any individual or group (although the expression, which we use only for lack of a better one, does *include* moral delinquency), but is an unconscious, or at least subconscious, reaction, mentally consequent on sinister environment.

The effect is wholly in the aggregate and not to be particularized; perhaps a better definition would be deterioration of moral resistive power due to adverse surroundings and conditions. In the individual it is largely imperceptible, but in the mass it is responsible for indifference, minor acts of carelessness and some disregard of the rights of others, but it is collective wholly.

Hence, an unkempt neighborhood is an undesirable one and is viewed askance by fire experts, although the moral character of every resident judged separately by the most rigid of current religious standards may be unimpeachable. We have a vague idea that such conditions breed criminal instincts, but do not know just how it comes about. The mere marring of plaster by driving a nail in a rented house that would not be driven in one's own is hardly an act of moral turpitude, yet the disregard of rights it breeds is a progressive one. There are no way stations on the long road that ends in punishable criminality.

Unfortunately the freedom of individual action under American institutions favors this moral undergrowth, however favorable such freedom may be in other respects. The roots of our natural vice, call it carelessness or whatever you will, lie very deep; the evil hard to repress is harder to exterminate and it is to the experts of social science we must turn for real relief, and some measure of remedy. Our tremendous fire loss, like crime, may be found to rest on an ultimate foundation of a national "state of mind" hardly curable and not greatly modifiable by exhortation or repressive law. "Making people good by act of legislature" has not hitherto proved a howling success because the inevitable tendency of too severe forcible repression in matters where the moral status is not fixed or readily and generally recognized is to produce reaction and evasion, which sometimes in turn produce conditions worse than those sought to be suppressed.

The inherent fire hazard of unexposed dwellings is fairly uniform, being internal chiefly, so that a well constructed wooden house is the practical equivalent

of one with brick or stone walls, not completely so if the obscure moral effect of greater permanence be considered, a factor of some importance, but probably not very great. It increases somewhat in the costly houses of the wealthy where care is entrusted to employes and ceases to some extent to be personal on the part of the owner, still more in very cheap or temporary houses where construction is inferior and structural safeguards lacking. Again where the occupant is a "tenant," and more strikingly where there is common occupancy by several families, due to the existence in these cases of "common territory" for the care and condition of which no one is directly responsible, once more modified favorably in large apartments of sufficient magnitude to afford efficient janitor service. This increase of hazard follows naturally the lack of incentive on the part of either landlord or tenant in the matter of good upkeep.

From the insurance point of view this is recognized and expressed in differential rates, especially in farm property, where a tenant farm usually carries a higher rate, in the graded rates on tenements housing more than two families, according to number, and as between isolated brick and frame construction, this latter preference having also the physical base of a probability of greater salvage rather than probability of fire, a preference increasing as completely fire resistive construction is approached and the danger of severe structural damage lessened. There is also a strong selective preference in suburban and rural territories for single family houses, (homes) occupied by the owners, not always expressed in "rate."

In urban territory a different situation prevails, since land, under pressure of population, speedily becomes too costly to permit of general allotment in individual areas sufficient to provide effective isolation, and homes are necessarily built in such proximity that fire may readily be communicated from a burning structure directly to others adjacent.

The specially vulnerable points contributing to the spread of fire are three: combustible roofs, combustible walls and wooden cornices or facings under eaves, in the order named, the first two being to a large extent subjects of legislation.

Combustible roofs easily take first rank as fire disseminators, being virtually long distance systems of transmission.

This "long distance" feature is the predominating hazard in dissemination, for, anomalous as it may seem, such a roof in close proximity is actually less dangerous than one at a moderate distance.

The reason is that roof ignitions take place mainly through sparks and brands and usually these are carried upward by the heat of the fire and by upward currents set up by that heat between the burning structure and others closely adjacent, and do not descend before being blown some distance by wind, so in case of an extensive district of shingle roofs we may speedily have to cope with a very considerable number of isolated fires, many at a distance from the original and always with a tendency to coälesce in one general conflagration. The number of such separate fires has at times run into hundreds, their very independence of each other making the work of combating their extension more difficult.

The somewhat prevalent idea that a hazard of this sort may be materially mitigated by interpolating occasional noncombustible roofs at irregular intervals in such districts or rows is fallacy, at least until the number of such roofs increases to the extent that they dominate or at least constitute a considerable proportion of the aggregate.

As soon as the flames find vent through sides or windows the upward currents that drive the sparks now direct the flame against cornices or projecting eaves, from which they spread rapidly to the roof via the exposed ends of roof supports, very rapidly if the roof is of wood shingles.

Ignition of the side walls of wooden buildings follows quickly but generally the first communicated fire is at the very top of the wall. This feature of exposure is practically not avoidable if roofs are pitched or walls frame, and as a rule does not take place before there is time for the fire apparatus to reach the scene. It is therefore very material whether there be a number of small roof fires, or whether attention can be concentrated on one.

Evidently the first and most important step in anti-conflagration effort is the prohibition of combustible roofs, even if the argument rests on the theory that a single fire spread by contact or proximity only is much less formidable than many lesser ones over a considerable territory.

For a number of years the National Board of Fire Underwriters and various fire prevention organizations have conducted an active campaign in promotion of anti-shingle roof legislation, resulting in the more or less complete passage of such legislation in 102 cities, classified as follows:

A. 1,000,000 population and upwards, none
B. 500,000 to 1,000,000..... 1
C. 250,000 to 500,000..... 3
D. 100,000 to 250,000..... 15
E. 50,000 to 100,000..... 15
F. 25,000 to 50,000..... 19
G. Less than 25,000..... 49

Of these, 2 of class D, 1 of class E, and 2 of class G are partial, limiting the operation to certain defined districts; in all other cases prohibition is practically complete. One city each in classes D and E saw the light but later recanted, abjuring righteousness and once more lapsing into sin by repealing the saving ordinances.

The reason for success of promotion in smaller cities in excess of the comparative number of such cities or for failure to secure legislation in the larger ones is not clear enough to base any definite theory on, but the fact is clear that the methods employed have been more effective in smaller communities. There probably is a sufficient reason, if it can be discovered, and from it a basis for more effective tactics worked out.

The geographical distribution is interesting and enlightening, illustrating the handicap under which the campaign for better construction and better fire prevention labors when presented in terms of cost.

At this time the supply of high grade cedar shingles is derived from the Pacific Coast, while the major part of the spark-resisting roof coverings are manufactured east of the Mississippi River, with the result in a general way that the relative cost of shingle and resistive roofings are more nearly equal on the Atlantic seaboard and the difference, adverse to protective roofings, increases as we go westward. Also there is a suggestion that the political influence of wood shingle makers striving for a market for their product becomes more potent as we approach the area of production. There is little difference in cost in New England cities but a very large difference in Seattle or San Francisco between the best grades of wooden and cut asphalt roof shingles. A geographical classification of the legislative results is as follows:

North Atlantic States..... 30
South Atlantic States..... 41
Southern States..... 23
Central States (Missouri and northward) 8
Mountain and Pacific States.....None

(Note: The fact that an anti-wooden shingle roof act has been passed by the legislature of California has not been overlooked, but since its operation is suspended for a referendum it cannot be counted an accomplished fact.)

Which in a general way follows the cost line pretty accurately and further suggests that the small concession in rates given by the insurance organizations is not large enough to effect results except in a limited area.

Promotion of an innovation is always difficult, even under favoring conditions. People in general are conservative, clinging to things used for many years, things they "know about." Slate and metal roofs are familiar, but to most people the danger of fire is a remote one, and slate and metal roof coverings are largely regarded as whims or expensive luxuries. As to other types there is hesitancy and to some extent distrust, the vending of inferior goods through "supersalesmanship" and the failure of such to give satisfaction exercising an adverse effect on public confidence.

Actually the difference in cost between good grade shingles and a corresponding grade of resistive roofings is not great, on the basis of entire cost of house construction nearly or quite negligible until one gets well west; but it is great enough to hamper all efforts at reform in that direction, for a very small

difference is sufficient for astute politicians to seize upon and by that prove themselves champions and defenders of the poor and of "personal liberty." This is enough of itself to wreck propaganda of merit, and where, as in many instances, it is supported by organized capital, there is scant chance of winning by present methods.

If the promotion of resistive roof construction in the interest of safety and conservation is difficult, much more so is the promotion of generally resistive construction, since against really constructive planning are lined up not only the forces opposed to resistive roofs but also other nearly if not quite equally powerful business interests holding any movement tending toward permanence and stabilization of values a fatal blow to them.

American cities almost without exception have grown very much at random with little control or planning and maybe less rational foresight, and at the enormous economic expense of periodical demolition and reconstruction.

The annual waste of this is tremendous although probably under existing conditions mainly unavoidable. At the root lies the speculative interest bent upon acquiring wealth through unearned increment and fluctuating values often artificially produced.

All of this operates to the detriment of better construction plans, not to mention the fire hazard of diminishing values and prospective demolition.

But how can we ask for more permanent construction with better safeguards in homes without some permanent or at least not readily revocable guarantee that through permanence of neighborhood character values will be reasonably stabilized?

No one will seriously deny that the mere construction of a factory or tenement (even though the latter be but a "duplex" home) in a district hitherto occupied solely for residences almost invariably results in depreciation, or that the erection of such structures is occasionally deliberately planned with a view to produce depreciation. The ultimate effect is to induce hesitancy through fear of loss on an investment usually absorbing about all of the available capital of the investor and in which duration of occupancy is an important factor. As a malign influence this deterrent quality is much in evidence.

In Europe many cities long ago, having come to realize the need of curbing private "enterprise" and putting community welfare first, largely solved the problem by complete public control and planning on a non-political basis, establishing permanent residence, manufacturing and business districts by public authority, clearly defining their limits, not absolutely unchangeable but requiring nearly universal assent of all in interest to change. This method has apparently produced very good results.

Radical and revolutionary as it may appear as applied to America, the lessening of conflagration hazard in our great cities by better construction, especially dwelling construction, depends to a large degree (possibly mainly depends) upon some positive method of stabilizing values in districts devoted to homes and in taking away from speculative interests much of the liberty they now enjoy in partitioning land and laying out streets. Multiplication of costly fire apparatus will not suffice, since it is poor policy to create an evil and tax ourselves and our successors to the breaking point to merely mitigate results.

Even as matters stand it may be possible to accomplish much by some system of intelligent co-operation for promoting better construction and by modifying existing laws, lessening or abrogating requirements determined to be needless or excessive by *competent, disinterested, non-political* authority, and which increase cost without corresponding results of value and imposing new restrictions where needed.

Viewed from the points of permanence and protection from conflagration the importance of brick construction for dwellings will not be denied, but unfortunately the difference in cost operates adversely even to the extent that whole districts in which wooden construction is considered inadmissable remain practically unused.

Presumably this condition will continue to a large extent, at least until the growing scarcity of lumber and conse-

quent increase of its cost brings about nearer equality or it be found possible to so modify existing legislation as to produce to some extent a similar result.

We can safely assume that in any plan for cheapening brick construction and increasing brick consumption that does not of itself involve lower prices for the material, the active co-operation of brick manufacturing interests can be relied upon, with even a chance that an increased demand might lessen prices. The value of such co-operation is considerable, and not in the least diminished by the fact that it lacks disinterestedness, since results, not motives, are to be taken into account, so far as they are not detrimental to the accomplishment of a proper purpose.

Clearly if our current regulations and legislation should be determined as imposing needless and expensive restriction, by entirely competent authority, the first step would be to secure proper modification, basing this upon the fact that the increased use of fire-resistive material in construction is distinctly to the public interest.

In this connection a proposition advanced by Mr. Wm. Carver at a recent convention of the Common Brick Manufacturers' Association at Cleveland, Ohio, appears to be entitled to some careful consideration.

The speaker here undertook to demonstrate the entire adequacy of brick walls eight inches thick in the construction of small residences (say not exceeding 2½ stories in height, or covering ground area not in excess of 1,500 sq. ft.), supporting his statements by apparently sound argument and further proposing that such walls be constructed hollow (i. e., with vertical air spaces or flues within) by laying the bricks on edge instead of flat.

Tests made by the association would appear to confirm this position so far as stability is concerned, or so far as any tests by any organization in interest could do so. Such tests may not, however be accepted as conclusive, not because there is the least room to question their entire honesty and adequacy, but simply because they lack the authority of tests conducted by and certified by wholly disinterested engineering organizations; hence they afford no sufficient basis for final conclusions.

If the stability and fire-resistive qualities of such hollow 8-in. walls are finally determined as adequate in further tests by some qualified body such as the National Bureau of Standards or the Underwriters' Laboratories, a step promising good results will have been taken.

There are even then some reservations as to how far such results as determined by tests would stand the further test of climate in different localities. Brick has the reputation of transmitting dampness and the amount of water brick will absorb varies greatly with grade, locality and process of manufacture. Moisture has been known to penetrate a 16-in. solid wall in an exposed situation to an extent that required extensive waterproofing. This was exposure to rain merely, not to water under pressure.

Economically would arise the question of the practicability of plastering direct upon such hollow walls without intervening furring, which is not now generally considered practicable in 8-in. solid construction, and the relative expense of the "three coat" work that might be necessary.

Very careful and thorough tests as regards fire resistance should be made, although the heat radiated by a burning dwelling across, say, a distance of five feet would not seem ordinarily to be severe even in wooden structures, up to the point where the entire burning structure is in flames. Window glass, which possesses the same resistance everywhere, seldom melts under such conditions if much water is thrown on the fire, and the heat would in any event be less if the walls of the burning structure were of brick.

What seems, however, to interpose the principal obstacle to any general acceptance of lowered restriction (except perhaps in some localized instances) is the almost total lack of standardization in common brick not alone as regards size, but crushing strength, density, weight and power of absorption of moisture.

Thus common brick sizes vary from 7½" x 2" x 3½" to 8" x 2½" x 3¾", the first quoted size being for the run of so-

called "New York brick." It will be noted that the cubic content of a single brick shows a 50 per cent approximate variation and the variation in actual *thickness* of a single brick wall (generally denominated as 8-in. wall) would vary by about 17 per cent variations, which are directly related to all questions of resistive power and stability. This 17 per cent must be considered in addition to any 20 per cent depletion of solid content for air spaces.

Classification of common brick is at present a rough separation into soft burned and hard burned; there is no definite guarantee as regards crushing strength or power of absorption, which must be determined visually and offhand or by crude experiment with (sometimes selected) samples. Brick of this sort vary largely in these respects.

The higher grades of brick are made fairly true to a standard size and with far less variation in density, but for the class of construction under consideration their cost is almost prohibitive.

It would seem as though no certificate of adequacy could issue as to this method of hollow wall construction not based upon definite dimensions, crushing strength and density of the brick used.

The first task, by no means an easy one, would appear to be the establishment of a standard or standards for common brick providing for uniformity of size and some symbol stamped on each brick to serve as a guarantee of the makers of definite density and crushing strength. Not necessarily providing uniform strength but means by which the qualities can be definitely guaranteed at time of sale.

When building ordinances demand solid walls 8″ or 12″ thick it is presumable that the framers know and understand the variations referred to and that such requirements include a sufficient factor of safety greater than would be required if the material was standardized in these respects.

If, however, as matters now stand the demand for 12″ or 8″ solid walls is excessive and works oppression, such laws should be promptly amended to concede hollow construction.

Such concession, assuming that it applied to a definitely limited class of structures and occupancies, would needs be accompanied by some very absolute provisions to insure continuity in classification and restrictions as to size and height.

This could hardly be made effective and "conversion" avoided except by the creation of "residence districts" or by "zoning" systems so established as to make encroachment on their limits or purposes extremely difficult; ordinances much harder to wholly or partly repeal than to establish.

That any such restrictive legislation would be opposed to the bitter end in general by very powerful interests, particularly those whose profitable operations rest largely on fluctuating values, is hardly open to question.

At this time the prospective home-builder is "between the devil and the deep sea." There is little incentive to good construction, although cost is probably the principal repressive feature, but in any event, if we are to have effective Planning Boards they must become superior, not subordinate, to these interests.

To all unbiased by financial and business considerations of a personal nature any method that will tend to stimulate the acquisition of individual homes is worthy of careful consideration and of earnest support if found worthy.

Our excessive national fire loss is less of a disease than a symptom, the real causes of which may often be sought in facts at first sight unrelated. It is certainly to some extent a state of mind, partly perhaps due to pride of achievement and somewhat to a reaction impelling the casting aside of much experience of value, an unwillingness to concede in others working under different conditions things we claim for ourselves.

The Essentials of a National Safety Code for Ladders

By Clifford B. Connelley

Commissioner, Pennsylvania Department of Labor and Industry

Proceedings of the American Society of Safety Engineers

TWO years ago when it was voted to revise the Safety Standards of the Industrial Board of Pennsylvania it was decided to include only mandatory rulings in our State Codes. This seemed like a radical step, especially since it affected some 30 codes on as many subjects, most of which had been in operation for from 2 to 6 years. It proved to be an easy matter, however, as most of the advisory (recommended) safe practice provisions had been tested during these years, and in the codes revised to date there was little or no objection to making them mandatory.

In writing new codes, however, the committees did find considerable difficulty. It would have been an easy solution to some of the problems that arose in connection with the drafting of our Industrial Sanitation Code and in the Head and Eye Protection Code to have inserted recommendations instead of rulings. In one of the drafts of the Head and Eye Protection Code, for example, 150 occupations were listed as requiring protectors. This list was compiled with much care and after considerable correspondence. It was not very gratifying to the sponsors to see this comprehensive list cut down to 9. That was the number finally agreed upon, after two public hearings, as the occupations where the wearing of protectors could be made mandatory. Many data of an educational value are, of necessity, eliminated from a code containing mandatory rulings only.

MANDATORY CODES JUSTIFIED

We feel justified, however, in taking this step. As State officials, our interest in a safety code is primarily that of law enforcement. We can enforce a ruling that has the effect of law, which is true of all the rulings of our Industrial Board, but of course are powerless when "shall" is changed to "should." While it may seem like narrowing the scope of our safety work, yet law enforcement has a big place in the safety movement, and the safety movement would not have advanced so rapidly and widely in this country without the enforcement of the favorable laws of the Federal Government and the States, bearing on the various phases of accident prevention.

This function of the government in fostering safety is sometimes overlooked. We are not taking this opportunity, however, to plead for recognition for the State, or for its government in safety conferences, safety discussions, safety drives and safety committees, but to point out that the government is concerned in such things. We in Pennsylvania feel vitally concerned in the drafting of national safety codes. From the beginning of the recent movement to "standardize safety standards" we have looked upon it with favor and have had representatives on many of the code committees, but we have also said that "the Pennsylvania-made code is the best code for Pennsylvania." We do not feel that we have been inconsistent in the position we have taken.

To be concrete, we favor most heartily a national safety code for ladders. And yet, if this code becomes the comprehensive, thorough and practical code for nation-wide application that the Ladder Code Committee of the A. S. S. E. desires for it, Pennsylvania cannot adopt it, certainly not as a whole. We could take it as a basis for a *Pennsylvania* code, submit it to a representative committee of employers, ladder manufacturers and safety engineers, as is our custom, and select the provisions that would apply in our industries and that could be enforced as mandatory rulings.

The point that I am making is that the

national code for ladders should be bigger than any State code. It should include both mandatory and advisory provisions, such as your tentative code does. It should include all types of ladders for every industry, which your code does not. A comparison with the revised Pennsylvania Code will show that we define and make regulations for 14 types of ladders The national code in its present form provides for but 9. Our regulations, due to the limited duties and powers of the Department of Labor and Industry, cover almost exclusively the mechanical and building industries. Mining, agriculture and transportation industries are thus left untouched in our code. A national code should be made as comprehensive as possible.

NATIONAL CODE HAS OPEN FIELD

A national code, moreover, should be written with a larger purpose than a State or municipal code. Usually a political division is circumscribed by fixed laws which more or less define the duties within certain limits. We write our codes within the law and keep before us continually the query, "Can this be enforced?" Sometimes it is lack of the necessary number of enforcement officers; or perhaps the time is not ripe, for this or that industry, to draft regulations that might seem more or less drastic. A national committee as organized at present without legislative restraint, so to speak, is a free agent, except in so far as governed by the rules laid down by the body which called the American Society of Safety Engineers' Ladder Code Committee into being, which, of course, is also without government sanction or legal restraint. The committee has an open field, and should in no such sense limit itself in the great objective of preventing industrial accidents.

This makes us bold to suggest what might be considered as a somewhat different conception of a national code than has been accepted to date. There can be no question but that there is too much duplication of effort in code making, due to the necessity of almost every committee that attempts to write a code to do pioneer work. A national code drafted along the lines of State codes now in existence, will not remedy the situation. Such a code will certainly be a more reliable piece of work than most of these existing ladder codes, which were constructed something like many of our ladders, without much expert skill or without thought of engineering principles. But unfortunately there is no obligation upon the State or municipalities to accept national codes, and we have not reached the place where all employers will install the ladders best adapted to the purposes of safety unless forced to do so by the law, nor will all employes use them unless the strong arm of the law requires it.

Our thought is therefore that real service in ladder code making could be rendered the country by such a committee as that of the American Society of Safety Engineers by the following means:

1. Gathering and compiling information on ladders, including a historical statement of the development of the industry.
2. Setting forth the specifications for construction of ladders of the various types.
3. Suggesting rules for use, backed by authentic data in the form of discussions.
4. Using abundant illustrations.
5. Furnishing data on the properties and strengths of various woods.
6. Describing ladder appliances.
7. Pointing out safety methods and practices.

A TEXT BOOK WANTED, NOT A LAW BOOK

These services would combine to make a source book for code making. Such a publication has been prepared by the Travelers Insurance Company, on scaffolds, and has been a great help to Pennsylvania in re-drafting our Scaffold Code. A similar book on foundries has been published by the National Founders' Association.

By way of summary our suggestion for consideration is that the National Code for Ladders be in reality a text-book on ladders, rather than a law book. It should suggest rather than dictate. It should be a source book on ladder information—an authoritative manual for making rules by State and governmental bodies—not a rule book.

Fatigue Study and Safety Work Co-ordinate

By Frank B. and Lillian M. Gilbreth
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Proceedings of the Tenth Annual Congress of the National Safety Council

FATIGUE study is the first step in motion study, and also in safety work, because it decreases the number of accidents as well as the wastefulness of operation methods.

The problems of fatigue and of safety bear a peculiar relation to one another: fatigue causes accidents; fear of accidents causes fatigue.

We realize fully the value of safety work in fatigue elimination in the Committee for the Elimination of Unnecessary Fatigue of the Society of Industrial Engineers, which serves as headquarters for the work of fatigue elimination.

There is no thought of combining the two types of work, so far as societies are concerned. But where the intensive work takes place, the same methods and devices, for example, the survey, can often be made effectively to do both types of work. The first step in fatigue study, the fatigue survey, makes a most convenient form and outline for analyzing, reviewing and improving accident-causing conditions as well as motion-study conditions. It can be started in any organization instantly. It forms an outline for a method of attack, and it offers a basis for interchangeable data in organizations doing entirely different kinds of work.

Again, the suggestion system that exists today in so many plants may well lay emphasis on safety and fatigue elimination. The systematic incorporation of "shop kinks" into operation methods will not only better these, but will arouse a definite, concrete interest in both subjects, an investigation into the theories, and a first-hand, intimate contact with the practice. The importance of the suggestion system as a vehicle for stimulating thought has seldom been realized, even by many of its enthusiastic users.

The home-reading box may be used as a medium for circulating literature on safety as well as fatigue. We are continually surprised to find ready readers not only for the news and fiction magazines that are put into the box, but also for trade catalogs, technical magazines and other literature that have to do with plant organization, operation and betterment. Such boxes are being introduced into schools as well as plants. The first school home-reading box, so far as we know, was established at the Nishuane School, Montclair, N. J., last Spring. The principal is far-sighted enough to leave all supervision and actual operation of this to the pupils, thus using it to develop initiative and executive ability as well as co-operation and interest in reading. It has proved a decided success.

The museum idea is progressing rapidly, in both safety and fatigue work. This covers not only a national museum, but a museum in every plant and organization if it is no more than a book of photographs, to arouse and focalize interest. Where either a safety or a fatigue museum exists, those interested primarily in the other might well study the exhibits from both viewpoints, and bring out advantages from both in the descriptions or captions. The information bureau may be used as such a museum, until space and interest for a real museum can be provided. It is often advisable to work through an existing activity, till the new enterprise is strong enough to make its own way. The information bureau, which exists in many plants at least in embryo, though possibly under another name or under several different persons or functions, is a splendid starting place for a museum.

It should be noted that all these vehicles, the survey, suggestion system, home-reading box, museum, and information bureau, are activities that appeal to and are available to all members of an organization. They are non-contro-

versial activities in which all can co-operate. Both fatigue and safety are non-controversial subjects. Work along both these lines is useful not only in itself but as furnishing a field where all may practice co-operation, to be later carried into other, perhaps controversial, activities.

Rest periods, chairs for work and rest, including chairs with springs on legs and foot rests to remove the effects of vibration,—these have an accident prevention as well as a fatigue prevention aspect.

Unnecessary noise, which has been considered an expected part of life in the street, the home, and the office, is an evil to be combated.

Facing workers toward the glaring windows, as is done even in otherwise well regulated shops, where "much light is needed," makes the work in silhoutte to the worker. Too much emphasis can hardly be laid on the old-fashioned idea of "light from the left side for right-handed workers," if the irreducible minimum of fatigue and fewest accidents is what is constantly striven for.

"White paint and white walls everywhere" should be not only a slogan, but a law. Paint the color of purée of pea soup, so popular in several large and prominent factories in America, would be covered with white paint immediately, if the managers had actual tests made of the fatigue caused to indoor workers by lack of maximum indirect sunlight. The belief in "neutral tones" of interior paint is founded on a fatigue amateur's guess, not on the results of research. The relation of white paint to possibilities of the One Best Way to Do Work is not realized in our country.

For example, our organization has found that it takes considerable time to get clients to paint all parts of tool-rooms and tool-cribs the whitest white. At first it is thought this will be hard on the workers' eyes. It might be, if too much artificial light accompanies it, but there never can be too much indirect sunlight in a tool-room or a tool-crib.

All such preliminary "work in common" in safety and fatigue can be supplemented and developed, as soon as seems advisable and profitable, by a more scientific investigation and procedure.

The method of finding the One Best Way to Do Work is identical with the method for obtaining the way of least fatigue and of fewest accidents. Finding the One Best Way to Do Work, including fatigue study for eliminating unnecessary fatigue, must include also the minimum of accidents, for in no other way can the lowest costs be obtained, the fewest absences, the highest wages not only per hour but also per year.

The investigations that lead to finding the One Best Way extend not only into the field of management, especially of motion study, but into the fields of physiology, psychiatry, psychology and other sciences that concern themselves primarily with the "human element."

Let us take simply one variable of motion study, habit or state of automaticity, and note how important it is in both safety work and fatigue study. It is one of numerous variables, many of them equally important. Habit, so long considered a cruel master, is now realized to be the most useful of helpers; automaticity—firmly established habit—may become dexterity, and finally skill.

In the study of the problems of habit we have found that the best results come from analyzing all work from the standpoint of the decisions and motions of which it is constituted. Unimportant decisions are turned over to automaticity, in order to leave the mind free for the achievement of the more important things which will improve the method or lead to promotion. As far as possible, useless, inefficient and ill-directed motions are discarded, and the sequence of necessary motions is determined, so that the body can perform these with least effort, least fatigue and largest resulting wages. When these motions are performed with such dexterity that automaticity results, we have a really efficient process.

If there is a dangerous condition accompanying the result, known to the worker, it not only causes unnecessary fatigue, but interferes with his automaticity.

It is seldom realized how fatigue or worry will interfere with automaticity. As an example, we call attention to the fact that, as fatigue slows down the motions, motions are not the same, because

fast motions and slow motions differ as to path or orbit and in many other respects. Not being the same, the automaticity is destroyed, for the time being at least. Automaticity being destroyed, there is more fatigue and then there are more accidents.

The so-called "irreducible minimum" of accidents can, therefore, be reduced in the study of the phenomena of automaticity of motions and habits of thought.

In the same way, the use of the methods of measurement of motion study—the micromotion method and the cyclegraph method—can be applied to accident as well as fatigue elimination, by determining the accident-causing features of an operation, and studying (1) variables of the worker, (2) variables of the surrounding conditions and tools, and (3) variables of the motion, with the emphasis on findings that effect safety.

"Matches Are Not Toys"

Photo from Underwood & Underwood, N. Y.

"Madam! You are allowing your children to imperil not only their own lives but the lives of every one near them! Matches are not toys."

Thus Fire Chief R. J. Scott of Los Angeles to Lois Wilson, leading woman in Paramount Pictures, who posed with May Giraci and Mary Jane Irving, child picture players, in aid of "Fire and Accident Prevention Day." (See page 194.)

Accident Prevention and First-Aid Work in the Telephone Field

By F. M. Downey

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Proceedings of the Tenth Annual Congress of the National Safety Council

THERE is a feeling existing among those outside of our business that line work is particularly hazardous. This theory has been exploded for all time, for we have no greater number of accidents among this class of labor than any other. In fact in 1920 in the line force in the division of the Bell Telephone Company whose work has been selected for today's discussion the number of accidents was far below that of any other class.

Long before any systematic country-wide effort was undertaken to reduce accidents the telephone operating companies realized its importance; and although it was not referred to as an accident prevention campaign, work was undertaken which eventually resulted in furnishing the organization with a reasonably safe place to work.

About eight years ago in spite of the fact that we had done a great deal towards preventing accidents, we continued to have what we considered an abnormal number of lost time cases. None of the associated companies of the Bell System, so far as we could learn, had undertaken any constructive work along these lines and we were unable, therefore, to obtain the benefit of studies or experiences. It was consequently necessary for us to work out our own salvation.

In connection with fatal or serious accidents to employes, we made a general study of the situation and realized that our problem was largely an educational one. A set of stereopticon slides was then developed showing the cause of a number of fatal accidents which had occurred in telephone work. This was done with the idea that it would impress upon the workmen that in their calling too much care could not be exercised in their daily work and that in the particular cases illustrated, had the unfortunate victims taken ordinary precautions, they would in all probability be enjoying life today. At the meetings in which these pictures were thrown on the screen and which were well attended by the working forces, the subject of accidents as a whole was touched upon in a general way.

In our efforts at that time to reduce fatal and serious accidents, we warned the forces, charged them to be cautious, to wear rubber gloves and to use safety devices when the occasion should demand. We standardized our construction where we occupied poles jointly with electric light and power companies, furnished tools of a high standard, instituted periodical inspections of plant and tools, and in many other ways endeavored to bring about ideal conditions to reduce as far as possible the liability to injury.

We next gave consideration to the though that perhaps we were not doing all we might in an effort to decrease the number of serious and semi-serious accidents which were occurring daily. We, therefore, mapped out an intensive campaign and organized accident prevention committees. These committees worked out a definite plan to carry out the program. Suitable forms were prepared and distributed widely to the working forces asking their co-operation in reporting hazardous conditions. The proposition took real effect and we succeeded in clearing up a good many hazards in the plant. By acknowledging receipt of the recommendations from the field workers and later advising them of the final disposition of their suggestions, we were able to add many enthusiasts to the movement. This was unquestionably a first class asset, because it was a real step towards gaining the support and confidence of the forces.

To start the year 1915 we determined to maintain a statistical record of acci-

dents with a view to reaching a conclusion as to the best methods to pursue to reduce the losses. By persistent application of the practices already suggested, we attained a figure of 7.4 lost time accidents per 100 employes for the year. When we analyzed this mark we felt it was too high in comparison to the efforts we had put forth, and we resolved to better it in 1916. We started well but the finish was even worse than the preceding year; the final result being 9.4 lost time accidents per 100 employes.

Due to the war activities' forcing a curtailment of our program and the employment of much new and inexperienced help, the year 1917 was a particularly unfortunate one for us. From a figure of 7.4 accidents with loss of time per 100 employes in 1915, and 9.4 in 1916, we rose in 1917 to 11.3 accidents with lost time per 100 employes. We are all familiar with the conditions existing during 1917 and up to the signing of the armistice in the latter part of 1918. The labor turnover in our organization was very high and many of our people who had been specially trained in our work were entering the military and naval service. We lost a great deal of ground and conditions following the armistice went from bad to worse with the result that our figure for accidents with disability for the year 1918 reached the hitherto unbelievable mark of 13 injured employes for every 100 people employed. This had gone far enough and the time for action had arrived.

To start the year 1919, the problem was studied with as great care as was possible and we decided upon a campaign more intensive than any heretofore launched. We first set out to arouse the fullest interest and enthusiasm of all the force including the supervising people. The several safety committees were called together and the need of concerted action explained. The forces rallied, aroused to the sense of their responsibility for their own welfare. Strange to relate, despite what we had done, we were in the first month of 1919 worse off than ever. We "got on the job" at once and the result was in a force of about 1,800 men the particular division did not have a lost time accident for 65 consecutive days. Our "run" was broken on the 66th day by a comparatively slight injury, a sprained ankle, sustained by a foreman. We started again and for the year succeeded in reducing our lost time accidents per 100 employes to 3.7, compared with 13 per 100 employes for the previous year. The campaign of education which was undertaken has been continued and by constantly keeping before our people the necessity of being careful, our problem has become simplified. The best performance to date in our division was recorded in 1920 when a figure of 2.8 lost time accidents per 100 employes was established. This compares with a rating of 6.3 per 100 employes for the entire company. The outlook for the present year is excellent and we are at this time running slightly under our 1920 figure.

Feeling the need of a knowledge of what to do in case of injuries sustained on the job, we tried out in the fall of 1920 an experiment in training groups of our people in first aid to the injured. We believe that first aid is first and foremost a cure, and while separate and distinct from accident prevention, it is unquestionably of great value and will certainly aid us in our efforts to reduce the disability following accidents. About the middle of last November we sent to each employe who was eligible to take the training a circular outlining the course to be given on the employe's own time. We had tentatively set a mark of 100 as the possible number who would avail themselves of the opportunity. To our surprise nearly 600 employes, or approximately 40 per cent of the plant force eligible for the first aid training responded to the invitation.

Beginning early in January 1921, 45 employes representing the various sections of the division were selected from the total registrants to take an instructors' course under a physician who was authorized by the American Red Cross Association to carry on the work. Instructions were given three nights each week at division headquarters. In exactly 23 calendar days the courses were completed, and an examination was then conducted under Red Cross auspices. Every one of the employes (except one

man who was prevented by illness from completing the work) passed the test with very creditable marks. The Red Cross authorities considered this an excellent showing and awarded each person a Red Cross certificate for proficiency in First Aid work and an authorization to carry on the work as lay instructor.

After the instructors had completed their tuition, the remaining employes who had registered for the training were divided into classes according to locations where they were employed, and the instructors at these points were assigned classes. The field classes started the first week in February and were completed early in March. The Red Cross organization then conducted examinations and of the 287 people who responded for the examinations, everyone passed with a very satisfactory mark, and all were awarded certificates.

After the examinations, five-man teams to the number of 36 (or 180-odd people) representing the various sections and working forces of the division were formed, and intensive training began under the direct supervision of the first-named instructors. The idea back of the team work was to have the largest possible number of men participate in the first aid team practice as often as opportunity afforded, the practice being held in the evenings on the employes' time and at convenient locations. After approximately two months of team training elimination contests were staged at the several Central locations in the division to determine the best teams in the respective sections. The winners of these elimination contests were then brought together for semi-final contests to determine the twelve best teams in the division, the survivors of the semi-final contests to participate in the final competition for the division championship, trophy and medals. At the final affair held in May of this year, the interest and enthusiasm ran so high that the Armory, the largest building in the headquarters city of the division, was taxed to its capacity, over 4,000 people witnessing the competition.

Our progress in first-aid training has been the subject of favorable comment by authorities and by some was considered a record. It is not possible, nor is it desirable to express in definite terms to what extent the employes, the public and the company have mutually benefited as a result of the first aid training. We are not at all certain that it will cut down the number of accidents, but we hope it will. We are reasonably certain, and we speak from the experience of other industrial concerns who have adopted first aid training, that we can reduce the seriousness of accidents as measured by the number of days' lost time due to the accidents. In one of the operating companies of the Bell System with whose work along accident prevention and first aid lines we are familiar, there has been shown a steady and marked decrease in the number and seriousness of the accidents.

We have learned by experience that there are several factors which are necessary to continued progress in accident prevention and first aid work:

1. It is a vital necessity to have the wholehearted and cordial co-operation, support and interest of the forces, both the supervisory and working classes, and all who have any bearing on the work. The forces and committees must work with faith, for unless the foundation of belief is prevalent the road will be rocky and the results scanty.

2. Competitive first aid demonstrations are invaluable because they serve to maintain the enthusiasm already manifested. When properly planned and advertised the first aid team contests bring out the crowds and a great many lukewarm employes are convinced and added to the movement.

3. The publishing and distribution of periodical bulletins showing the cause and result of accidents, and the remedy, is excellent accident prevention propaganda. These need not be lengthy or elaborate, but brief, concise and illustrated where necessary.

4. The publishing of monthly scores showing the number of accidents per employe, or per 100 employes, by forces, is another form of maintaining the good effects already gained. This scheme introduces a sporting feature into the work and we find it is productive of good re-

sults for no supervisor wants to be in the limelight in this connection.

5. The development of committees whose duties comprise the reviewing of reports of accidents when they occur, preparation of educational data for the working forces, reviewing of practices and circumstances which might be productive of accidents and general supervision of the work. These committees are very important links in the organization and are the clearing houses for the movement.

The future results in the development of accident prevention and first aid in the telephone field rest to a great extent on what we shall be able to do based on our previous experience. An increased loyalty and efficiency that is difficult to measure has been obtained through our accident prevention and first and program.

In connection with our first aid work, there is a factor which is outstanding because of its unusual nature. When we planned the campaign it was specifically made clear to the employes that all of the training would be *voluntary and on their own time.*

Through all sorts of winter weather, through all manner of handicaps (traveling long distances, eating cold meals or perhaps none at all), the forces stuck to the job, with the result that although only 332 of the original registrants took the final examination, practically every one of the 600 employes who participated in the work possesses a knowledge of what to do and how to do it should the occasion demand.

Who Originated the Safety Movement?

European Ancestors of "Safety First"

AMERICANS are apt to think of the safety-first slogan as standing for an essentially national part of industry. But we are getting recurrent jolts in the padded course of this belief. Speaking before the Associated Engineering Societies of St. Louis, Dwight T. Farnham, consulting industrial engineer, recently recounted the impressions he had gained from a tour of industrial Europe. He found Europe well equipped and ambitious, and with more of a history of industrial management than we have generally credited to her. "Safety First," said Mr. Farnham, "is another one of our industrial children whom we like to trot out with pride when the minister calls. Since I returned from Europe I am more than ever convinced that he is a lusty infant with a future before him, as I met two of his grandfathers in Germany, another in Italy, and three more were fighting for the honor of siring him at the Safety First convention in England.

"So it is with welfare work, schools for apprentices, factory canteens, créches, plant doctors and dentists, athletic instructors, workmen's housing schemes, co-operative stores, hospitals, athletic fields and factory magazines. Germany has developed psychotechnical tests for workmen and is using them in her factories, while we are only discussing the practicability of such methods for fitting square pegs into square holes in industry.

"We should take advantage of this opportunity to go over our whole organization plan... There couldn't be better opportunity... We might undertake a survey of the nearby plants and see whether we have better or worse work conditions to offer in case men become scarce again. It's a good time to see to safety guards, lighting arrangements and sanitation. We might give some thought to the elimination of unnecessary fatigue. Perhaps while we are rearranging the factory we can find a place for that canteen we have been talking about for some time. If we put the right sort of tables and seats in it, it will do for safety first lectures... We can get ready in a quiet way to build up a force of well-trained, healthy-bodied and healthy-minded, loyal workmen and executives who will see us through the most of our troubles."

Mine Fire Prevention and Fighting in Bituminous Coal Mines

By Joseph W. Reed

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Proceedings of the Tenth Annual Congress of the National Safety Council

FROM our point of view, safety, we must in addition to the prevention of ignition of fires, consider the prevention in so far as possible of the quick propagation of the fire,—not only of the flame and heat, but also of the smoke and poisonous gases throughout the mine. We must consider this subject from the point of view of the open light mine as well as that of the closed light or so-called gaseous mine. In my way of looking at the subject it is divided into two parts: (1) the prevention of fires caused by contact between flame and combustible material, and (2) of fires caused by the arcing or overheating of electrical circuits or equipment. In order to try to give you something of practical value I have limited myself to a discussion of those things with which I am familiar, through their rather general adoption as standard practices by the company with whom I am at present connected, and whose effect in causing and preventing mine fires I have noted over a period of years.

PREVENTING CONTACT IGNITION

As far as fires caused by contact of flame with combustible material are concerned, fire prevention inside the mine is identical with fire prevention in buildings, in that in general it is things of seeming insignificance that need our most careful preventing and guarding. While to the fire preventionist it seems as if only the use of ordinary good common sense should be necessary to foresee and prevent these little things which are dangerous fire hazards, yet it is unfortunately true that they frequently seem invisible to many of our foremen and others employed inside of the mine. If fires are to be prevented then most careful attention must be given to simple preventive means such as the following:

Prevention of the building of wood structures, the so-called "wood shanties" inside of the mine.

Prevention of hanging of coats, feed sacks, etc., on wood or flammable brattices.

Not permitting trapper's benches to be built against door frames.

Careful inspection of the face for fires before leaving the mine following the use of black powder for blasting.

ELECTRICAL FIRE HAZARDS

For the prevention of fires due to overheating of electrical circuits or equipment it is very essential to have the following things followed out as closely as possible:

Housing of all high tension electrical equipment, such as inside sub-stations and pumping stations, within fireproof rooms which are equipped with heavy iron doors at all openings leading from same.

Adequate protection from overload by circuit breakers located at the power stations.

Further protection against overload in large circuits by dividing them into smaller units by means of automatic circuit breakers installed on the more important branch circuits inside of the mine.

An adequate amount of copper in all electric feed lines for the load normally carried, together with good and sufficient bonding of the rails forming the return side of the circuit.

Cutout switches on branch circuits: and having same opened at night or as soon as work on that entry is finished for the day or shift.

Fused "by-pass" circuits bridging over the cutout switch on such branch

circuits as require power during the night for pumping purposes, fuse being only of sufficient capacity to carry pumping load.

Use of standard trolley wiring in which the wire is required to be kept 1 ft. outside of the rail.

Use of moisture-proof tube insulators where wires pass through door frames or brattices.

Use of non-flammable material for air check curtains and wing brattices.

Automatic starters for irregularly attended stationary motors, such as pump motors, permitting the use of fuse of sufficiently small capacity for adequate protection against overheating and burning of armature.

Use of fire walls of brick or hollow tile between the motor and combustible material, such as coal rib or timbers, and sheet iron protection over top of the motor where coal or timber is close over top of the motor.

PREVENTION MUST BE COMPLETE

The above covers briefly the more important elements necessary to successful fire prevention, but we must not forget that the most essential feature is the use of good common sense and judgment. To be effective at all guarding and preventive measures must be made effective throughout. As practically all mechanical means of guarding electrical circuits do at times fall down, they must be backed up by further protective measures, and these in turn protected against failure. Even fire-walls do not afford protection unless they are properly installed, and flammable material, other than that protected, kept outside of the fire-walled area in order to prevent propagation of the flame outside of the fire-walls. To show how frequently a foreman will most carefully follow out a set of fire prevention instructions and make a wasteful expenditure of money by either later tearing part of it down or by failing to use good common sense in making the installation completely effective I have prepared a couple slides showing faulty installations.

[Mr. Reed here showed a lantern slide of an automatic starter located in a sheet iron box to the left of the motor. While in good condition the installation is probably safe, but the well constructed fire-wall, together with the sheet iron protection for the roof, is probably a waste of money as it has failed to provide complete protection. A tar-impregnated wood pipeline of intensely inflammable nature has been passed back directly over top of the fire hazard, the motor, and would quickly carry the flame out of the protected area into the mine.

The second slide showed a partially protected small size motor. The fire-wall surrounding same is adequate, but the presence of the mine prop inside the fire area, and the removal of the protection over top of the motor renders its value for fire protection almost an entire loss.

A well enclosed fire area, both around and over top of the motor, was shown by another slide. This fails to give fire protection, from the fact that the starting box, only slightly less of a fire hazard than the motor, has been mounted on a wood prop without any protection in the way of asbestos back of it. The pumper has further rendered the walled-in area ineffective, by providing a means for propagating the flame away from the burning motor by means of the oil-soaked bench he has rigged up against the bed plate.

The method of mounting chemical fire engines on a truck so that they are easily transportable inside the mine was the lesson of another slide. This also showed one of the regular trials being made of the engine for proving that same is in working condition, and to familiarize the men with its operation.

The last slide showed the method of construction of the railroad cars used for the storing and transporting of chemical fire engines for general service at any mine.]

FIGHTING MINE FIRES

As only an approximation of perfection can be obtained in any methods of preventing mine fires, it becomes necessary to provide means for extinguishing them; and I will limit myself in the subject of fire fighting to a very brief consideration of such supplies and equipment as we have found it practical to adopt for mine fire fighting. These consist principally of equipment quickly available for the quenching of the fire before it can gain sufficient headway to require much in the way of expert knowledge in handling it.

In our larger mines, especially those which are gaseous and where the stopping of the air currents would be accompanied by serious danger, we find it advisable to provide water barrels and buckets about 20 ft. from each side of trap doors on haulways and other doors where electric wires pass near or through same.

Small hand fire extinguishers are used to some extent, and placed at points

where it is felt there is more than ordinary danger of ignition of small fires.

Our larger mines, especially those classed as gaseous, are equipped with chemical fire engines of 50 or 100-gal. capacity. These fire engines are located at central points inside the mine and are mounted on light trucks so that they can run on the mine track and thus be easily transported to any part of the mine.

For general protection of all mines, and to assist the equipment at the larger mines, special railroad cars have been rebuilt so as to house and transport large size chemical fire engines. These cars are located on easily accessible railroad spurs at central points in our various fields. The fire engines on these cars are also mounted on a light truck so that when the car arrives at the mine the fire engine can be unloaded on the mine supply track and quickly transported to the fire.

We follow the general policy that it is much easier and less expensive to have equipment quickly available for putting out the fire at once before it gets beyond control, and put forth every effort towards that end. Yet we do follow the rather usual policy of at once sealing off such fires as show signs of getting beyond control, and confining them to a certain area until they smother themselves out, or until further material and supplies can be brought up for a further fully organized attack upon the fire.

To provide against such emergencies we endeavor in addition to the usual mining supplies to keep on hand at some central point a stock of metal pipe, extra fire hose, auxiliary fans, high pressure pumps, extra rolls of brattice cloth, and maintain three mine rescue stations at which are kept oxygen breathing apparatus and supplies.

From this paper it may seem to some of you that our mines are just one fire after another. However, I desire to say that our prevention methods are rather effective, and for the number of mines we operate we have very few fires of sufficient size to be dignified by the name of a mine fire.

Red Cross in the Industries

FROM the 11th to the 24th of November the Red Cross will hold its Fifth Annual Roll Call. The Roll Call is not a campaign. It is simply the opportunity for the American people to join the organization for the coming year. The membership fee is one dollar.

For every 10,000 American workmen employed, seven were killed in accidents during 1919, the latest year for which the American Red Cross has found complete statistics available. The total number of casualties was 45 per cent of the number of Americans killed in battle during the World War.

The experience of the American Red Cross conclusively proves that the accident rate among men who have received efficient instruction in First Aid and accident prevention, is 75 per cent less than among the uninstructed. As a result of Red Cross efforts, First Aid instruction has been given to hundreds of thousands of industrial employes. More than 500,000 railroad men alone have had the Red Cross course. Many large corporations, such as the Bell Telephone Company and the Southern Pacific Railroad, have instructed their men.

The Red Cross stands ready to give its First Aid course to any group of people anywhere in the country who wish to take it. All chapters are organized to give First Aid service, and will provide all necessary materials and assist in forming classes and choosing an instrutor. The course consists of 10 lessons of an hour and a half each. These lessons consist of lectures and demonstrations based on the best Army and Navy practice. An advanced course of five lessons is also given, at the end of which the student should be proficient in treating wounds, burns, strains, fractures,

dislocations, shock, hemorrhage and in performing artificial respiration. In industrial plants the course is usually given on the employer's time, the cost aside from the time element being about one dollar per man.

It is with the dollars collected during the Roll Call that the First Aid work, the public health and disaster relief work, and the work for the disabled soldiers is carried on. All who are interested in the ideal of service for which the Red Cross stands are urged to join this great army maintained for humane service.

Cigarettes, Matches, Waste Baskets

Photo from Underwood & Underwood, N. Y.

"Stop! Put That in the Ash Tray!"

Thomas Meighan and Conrad Nagel, Paramount stars, posed for Fire and Accident Prevention Day Campaign. (See page 194.)

Editorial

THE HARRISBURG CONFERENCE

AMONG those who are identified with the safety world there exists a feeling that commercial enterprises are inevitably mercenary. So, quite often, exhibits of manufacturers are eliminated from public safety gatherings.

Twelve hundred establishments in the United States manufacture safety appliances. The men who devote their capital and their effort to this work are singularly fortunate. For, while they make the profit which is theirs by right, they also have the knowledge that they are conserving life, health and property.

These business establishments are not eleemosynary in their character. The establishments are conducted for profit. Yet every circular they send out, every letter they post, every call one of their salesmen makes, results, in the last analysis, in propaganda for the betterment of the human race.

Then why should not safety conferences co-operate to the fullest extent with these business institutions?

There is only one answer. And that was shown emphatically at the Industrial Relations Conference at Harrisburg.

It is to be assumed that safety and welfare meetings have a purpose other than talk—and talk. At Harrisburg, a manufacturer who became convinced of the necessity for safety appliances, at the meeting in the State capitol, had only to step across the street to the Penn-Harris Hotel to find the goods he needed.

Is business a thing to be condemned? Because a man happens to make money by serving the world is his name to be mentioned with bated breath?

At the Penn-Harris the entire ballroom on the second floor was crowded with safety exhibits. It was made possible for interested buyers to come from the meetings and examine devices for the safeguarding of their employes.

The Harrisburg conference was an official affair, conducted by the State of Pennsylvania. On this account, there could have been a reasonable explanation for omitting the exhibits. Besides, handling exhibits and exhibitors entails a great deal of work, for which the man who puts his shoulder to the wheel gets no credit.

All the excuse that would have been required was to have said: "The State of Pennsylvania might be understood to be officially approving the appliances exhibited." And there would have been no exhibits—as often at such conferences there are not.

But John S. Spicer, acting as director of exhibits, secured 27 exhibitors, and (it may well be added), a tour of the exhibition room was as practical and effective an education along safety lines as any day crowded with lectures.

Of what use is ethical teaching if it does not bear fruit in definite acts? The average executive is no more inclined to pore over statistics and recondite lucubrations than is the average employe. What he wants to know consists of two factors: (1) What to do, and (2) How to do it.

This information the Harrisburg conference was able to provide. It was able to provide it because Mr. Spicer was not averse to taking off his coat and working. In fact, on the first day of the conference, he was to be found helping to build booths for delayed exhibitors.

Not only did Mr. Spicer procure the attendance of the exhibitors, but he helped them get their bearings. As it worked out, every inch of available space was taken, and three exhibitors were crowded into the hallway.

Mr. Spicer showed a spirit that may well be emulated by those in charge of similar expositions.

A MAN-ON-THE-STREET STORY

To the Editor of SAFETY ENGINEERING:

SIR: An editorial appearing on page 118 of a recent issue of SAFETY ENGINEERING, entitled "When Preachers Do Not Practice," has just been called to my attention and I hasten to bring the facts to *your* attention.

The editorial describes and comments on a case of drowning at a picnic on the shore of Lake Michigan. It says that "not a single person present knew how to administer first aid!" Also that "the picnicking persons . . . proved to be, when identified, the office force of the National Safety Council."

The facts are as follows:

The picnic was held last July and there were five persons in the party. Only one of these had any connection whatever with the National Safety Council, a young lady employed as an office stenographer. One of the young men in the party was seized with cramps when far from shore and sank. A physician and pulmotor were summoned and were waiting when the body was recovered by divers about one hour later. The physician endeavored to resuscitate the young man, using both first-aid methods and the pulmotor, but without success. The young lady from the National Safety Council office is familiar with first-aid practice.

It seems hardly necessary to point out the injustice of your editorial or the harm that it may do to the safety movement and this Council. I shall be glad to hear from you what you intend to do in the premises.

Yours very truly,

A. H. YOUNG, President, N. S. C.

It is our intention and keen desire to serve the ends of justice.

The story of this accident, coming to us from two sources, suggested a casual human-interest editorial to indicate that even in the "inner shrine" of the safety movement Homer might nod.

Mr. Young's statement of the facts shows, of course, that the premises were wrong; therefore the comments were unjust. We ask unanimous consent to amend the article "When Preachers Do Not Practice," published in the September number, by striking out all except the first paragraph.

SAFETY ENGINEERING was misled by a man-on-the-street story.

We have a genuine respect for the poise, dignity and ability of the newly-elected president and intend to give to his administration such assistance as we can to make it a memorable success. Naturally, we have no wish to injure the safety movement for we have an interest ourselves, as the pioneer publication devoted to this movement, in having it go forward to a splendid future.

The Need of a Safety Code for Ladders

By F. A. Davidson

Safety Engineer, Dwight P. Robinson & Company

Proceedings of the American Society of Safety Engineers

IS there a need for a National Safety Code for Ladders? As the discussion appears to the speaker, there are three distinct questions at issue:

1. Are ladders responsible for a sufficient number of accidents to warrant the drafting of a special code?

2. Will a ladder code in any individual State or States be of assistance in preventing ladder accidents?

3. Is there any advantage in having a national ladder code?

Taking these propositions up in the order stated, let us then inquire into the charge that the ladder under present conditions of use is a serious offender against life and limb. Unfortunately, the justice of the charge is borne out both by such records of ladder accidents as are available, and also by competent personal observation.

It is a characteristic of the engineering type of mind that it likes to base its judgment on the figures of actual performance.

[Mr. Davidson described the futility of the searching for comprehensive accident statistics.]

In the year 1919, the Industrial Accident Commission of the State of California reports that there were seven fatalities, 21 permanent and 794 temporary disabilities, making a total of 822 accidents in connection with the use of ladders. The population of California in 1920 was 3,426,000, so that the commission's records indicate approximately 1.0 lost time ladder accident to each 4,000 of population. For the sake of arriving at some sort of an estimate, let us proceed on the assumption that the ratio of 1.0 ladder accident per year per each 4,000 of population holds for the whole United States. Applying this ratio to the figure of 105,683,000, we derive a total of 26,421, which, lacking other evidence to the contrary, we may consider as a crude estimate of the total number of tabulatable ladder accidents occurring yearly in the country.

In some rather unusually complete tabulations from the Wisconsin Industrial Commission, the broad classification headed "Falls of Persons" is the single heading showing the worst record, and one-fourth of all the accidents in construction fall in this group. As subheadings under this group, it is shown that ladders and scaffolds combined are responsible for 40 per cent, or almost half, of the falls of persons. Of the combined figure of ladders and scaffolds, more than one-third of the cases are attributed to ladders alone. In fact, the accidents from ladders alone listed under "Falls of Persons" amount to practically 4 per cent of the total lost time accidents reported from all causes in the construction field. Moreover, since practically all of the injuries are severe, the total actual money paid out every year simply in benefits, as the result of these ladder accidents reported, amounts to an average of about $13,000 or more than 4 per cent of the total actual money paid in benefits for the whole building industry in Wisconsin.

[From the records of accidents kept by his own organization Mr. Davidson cited the following conclusions.]

About 2 per cent of all our accidents for 1919 and 1920 are attributable to ladders, and during this period ladder accidents caused a total of 739 days lost time among our field forces. Even taking our figures as a basis—and the writer is fully convinced that they are far below the average—one would obtain a gross total of ladder accidents for the construction industry as a whole that would be sufficient to convince one of the necessity for dealing with this problem.

The well known facts of ordinary experience point with equal certainty and in the same direction as the recorded statistical facts, that is, that in the use of the ladder there lies at the present time a hazard that should be eliminated by every possible means.

A ladder code in any individual State or States will help to reduce accidents in the first place simply by focusing public attention on the dangers involved in the use of poor ladders, or in the improper use of good ladders. Simply the idea itself, the mere fact that the State authorities recognized the need of such a code, will serve to call the attention of many to something they had never thought of before, namely, that there is such a thing as a right and a wrong kind of a ladder, and that there is a right and a wrong way to use a ladder.

In the second place, however, and of greater importance, is the reduction in accidents that a code will accomplish through the gradual process of educating the public. A proper code does not stop simply with the pointing out of hazards through its prohibition of unsafe ladders and unsafe practices, but it also describes completely with adequate details and specifications just what constitutes a safe ladder and what constitutes safe practice in the use of a ladder.

Many ladder accidents occur not from a wilful or deliberate disregard of safety measures, but from lack of knowledge as to what is safe and what not. A code provides a remedy for this lack of knowledge. In the light of it there will be no longer any excuse for the employer to allow his men to work on such flimsy contraptions and queer imitations of real ladders designed on the principle of patchwork quilts as can be found at the present time by anyone who sets out to inspect existing ladder conditions. Nor as the educational process is carried further will the employe be so apt to persist in using even good equipment in the wrong way. A provision in the compensation laws similar to that in vogue at the present time in Wisconsin, to the effect that following any accident the employer must pay an additional 15% compensation if he had violated the code, and the worker has 15% of the compensation deducted if he is the one who had violated the code, is one possible way to speed up the educational process.

Furthermore, a code will be of considerable assistance in reducing ladder accidents by serving as a manual and guide to the various State, local and insurance inspectors. Many men on these inspection forces will be thoroughly qualified in numerous lines, but will have had but little experience with ladders. With the code for a text book, they can quickly become thoroughly competent to pass on ladder equipment and thus, in a few weeks, gain the knowledge that might otherwise take years. Naturally, this increases their effectiveness and has a corresponding reflection in a lessened number of ladder accidents.

Finally, a code will decrease accidents by adding the sanction of law to compel safe conditions with respect to ladders in those cases where through sheer indifference, stupidity or a cold-blooded desire to make the most profit at whatever cost in terms of human beings, serious violations of the ordinary rules of safety are persistently found.

It is evident, therefore, that a ladder code, drawn up and promulgated by any individual State, will render distinct service in reducing accidents. Let us next inquire whether or not there is an advantage in having a national code that will gradually be adopted by each State and eventually apply equally in all States.

There is a decided advantage in having a national code and the reasons are so self-evident as to require nothing more than merely a statement of them. First, it will save time and money involved in having many different groups of persons working over the same problem, if a comprehensive study of the entire problem is made once and for all by a competent committee, and a satisfactorily balanced code agreed upon, that will be capable of universal application. At the same time, it gives a wider field from which to draw individuals to draft a code, which means that the talent devoted to the problem will be of a superior order than it is ordinarily possible for any individual State to assemble. This will naturally result in a better code being produced than if each State works separately.

To concerns and particularly construction firms doing business in several States, a national code will be of inestimable value. It will enable them to adopt fixed standards for ladders and

train their forces to use nothing else. With different requirements in the codes of different States there will be endless disputes between such employers and the inspection authorities, with the result that ill feeling will be created and there will be no co-operation.

Finally, a national code will aid in the economy of manufacture for it will prevent the needless production of many different types of ladders, varying perhaps but slightly and needlessly. It will help to eliminate manufacturing practices which are merely the result of chance or tradition. By concentrating on the essentials of good ladders, it will discourage the introduction of confusing elements intended merely for sales effect. It will enable every national ladder manufacturer to turn out ladders that will be acceptable in all States, so that buyers will be able to obtain competitive prices from a wide field, with the assurance that they are buying safe ladders and at the same time are purchasing economically.

Hence, for the reasons quoted and others which time does not permit to be mentioned, it will be agreed that it is very much worth while to have a ladder code of national scope. We can come to no other conclusion than that there is a great need for a National Safety Code for Ladders.

Prevention of Accidents by Good Lighting

WHAT is it, then, that good lighting accomplishes in the prevention of accidents?" asks C. B. Auel, manager of the employes' service department, Westinghouse Electric & Manufacturing Company, in his article, "The Unexpected Trend in Accident Prevention," in the initial issue of *Management Engineering*. "Nothing, of itself, but by pointing out the unsafe places, the obstructions, the tripping and falling hazards, the filth, and the dirt, it tends toward their removal. Moreover, it introduces a bit of cheerfulness, the antidote to so many of the lesser ills, into even the gloomiest surroundings. It may, therefore, be set down as one of the principal safety devices which can be installed in any plant."

INCREASED COST OF GOOD LIGHTING LESS THAN TWO MINUTES' OUTPUT

Making the not too difficult assumptions that poor lighting costs one-half what good lighting does, that good lighting for any average factory space in which 5 men can work comfortably, may be furnished by one 500-watt overhead lamp, plus five 60-watt lamps, one for each worker, that current costs 3 cents per kilowatt-hour, that the men work 48 hours per week 52 weeks per year and earn 70 cents per hour, that the selling price is 15 per cent above the commercial cost, and 6, 10, and 20 per cent interest and depreciation charges on an original installation cost of $45.18, Mr. Auel computes that the part of a day required to earn the increased cost of good lighting over poor lighting per man is .003 day, or 1.44 minutes.

A chart, compiled by the Travelers Insurance Company from data gathered by John Calder on 95,000 accidents is issued by Mr. Auel to show "how accidents increase during the winter months coincident with the short dark days, and fall off in the summer months with the corresponding long light days."

DAY AND NIGHT SHIFTS

"Similarly, a comparison of accidents in the iron and steel industries from 1905 to 1910 showed that at night the accidents in the mechanical department were 118.3 per cent greater than in the day, while in the yards they were 127.6 per cent greater. The United States Government report on the subject states that the night force of yardsmen is smaller than the day force, but their duties do not differ sufficiently to afford an adequate reason for their higher rate. The influence which it would appear could exert any considerable effect upon their rate is the difference in lighting."

Safety News and Comment

Convention Date Advanced

NOVEMBER 1-4, 1921, instead of November 8-10, as announced in the September issue of SAFETY ENGINEERING, are the revised dates for the annual convention of the Industrial Relations Association of America to be held at the Waldorf-Astoria, New York City. The calling of the Disarmament Conference in Washington for the week of November 7 made it advisable to advance the dates to the preceding week, in order that certain of the Cabinet officers might be present.

November 4, the last day of the convention, will be a joint session with the Academy of Political Science, at the Hotel Astor, Broadway and 44th street.

California Safety Association

A PUBLIC meeting under the auspices of the California Society of Safety Engineers was held in the San Francisco Commercial Club rooms August 30, with the object of establishing a permanent public safety organization. The California State Automobile Association, the Motor Car Dealers' Association and the Chamber of Commerce all pledged co-operation.

Safety Meetings in Syracuse

PLANTS which have recently held safety meetings in Syracuse include the Syracuse Washing Machine Company and the Benedict Manufacturing Company. A speaker at both of these meetings was Frank E. Morris, secretary of the local Syracuse Safety Council.

Downtown Hospital for New York

A DRIVE for the construction of Broad Street Hospital to serve downtown New York has advanced to the stage where construction will not be delayed by lack of funds, although $750,000 more must be pledged. The new Stock Exchange Annex is exhibiting a score board showing how downtown concerns are meeting the drive. Many offices are conducting interoffice drives as auxiliary to the firm subscriptions; all the paraphernalia for such drives are provided, including pledge cards, buttons, etc.

Health First Fortnight

THE American Public Health Association will hold in connection with its semi-centennial meeting in New York City November 14-19 a fortnight's campaign for the observance of "Health First," to include a Health Institute, November 8-11; a Health Exposition, November 14-19; and the annual meeting of the American Public Health Association, November 14-19.

November 13 will be observed as Health Sunday in many churches. Health Day will also be observed in synagogues. The New York County Chapter of the American Red Cross is co-operating with the general committee in these arrangements.

The Public Health Exposition will be in the Grand Central Palace, under the joint auspices of the New York City Department of Health and the American Public Health Association. The exhibits will represent educational and philanthropic work and commercial houses producing approved articles of health value. Dr. Royal S. Copeland, Health Commissioner of the City of New York and chairman of the exposition, will present a series of educational exhibits in which instruction in the feeding of children will be featured.

The Health Institute, November 8-11, sponsored by the American Public Health Association, the Health Department of the City of New York, the New York State Department of Health, the United States Public Health Service, the Na-

tional Health Council, and the Committee on Public Health of the New York Academy of Medicine, will present about 40 demonstrations. The thoroughness of the program may be gathered from the fact that the chairman of the committee in charge is Dr. W. A. Evans. The director of the Institute is Dr. Donald B. Armstrong of the National Health Council.

The sessions of the annual meeting will be at the Hotel Astor, New York.

Spence, Lime Association Engineer

PETER C. SPENCE, since 1914 accident prevention engineer and expert in building construction and ventilation for the Department of Labor of the State of New York, has been appointed manager of the construction department of the National Lime Association. This appointment follows Mr. Spence's work as president of the Consolidated Iron League and vice-president of the Consolidated Building Trades Credit Association.

The chief present responsibility of the construction department of the National Lime Association is an investigation in which it is co-operating with the United States Bureau of Standards and other laboratories to determine the action of lime in construction, e. g., its effect on concrete, its fire resistance in plaster, the composition of lime plaster for special uses, the acoustic properties of lime plaster, and its adaptability for use with such new building materials and practices as concrete, hollow tile, metal lath machine mixers and automobile transportation of mortars

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Lead Mine Safety Measures

THE National Lead Company, operating the St. Louis Smelting & Refining Works in the Flat River district of Southeastern Missouri, maintains an efficient safety organization, according to J. F. Thompson, superintendent of mines for the company, speaking before a recent meeting of the Associated Engineering Societies of St. Louis. The stopes are said to average 30 feet in height, with variation up to 100 feet. "The high roof is made safe by taking down the loose slabs from a suspended scaffold." The company has a hospital with a surgeon and nurses always on duty.

Fire Marshals' Convention

THE Fire Marshals' Association of North America held its 1921 convention at Chattanooga, Tenn., September 22-24. J. A. Tracy, State Fire Marshal of Iowa, president of the association, delivered his presidential address on the first day of the convention. He urged careful consideration of the following preventive measures:

1. Better co-operation among all fire prevention agencies, and especially the fire marshals' association.
2. State legislation for a more uniform arson law.
3. State law compelling the teaching of fire prevention in all public and private schools.
4. Strengthening the fire marshal law to give the fire marshal more authority in removing fire hazards and to have all of his orders sent by registered mail legal service.
5. A drastic law covering the handling and storage of gasoline and other volatile oils.
6. The enactment of a personal liability law, holding all persons liable for damages for allowing a fire to start through their own gross carelessness, or by maintaining fire hazards after being notified to remove them.

On the following day Insurance Commissioner G. Waldon Smith of Maine, in an address on the question, "Should All Fires Be Investigated, and Should Fire Marshals Approve Adjustments before Payment?" urged at-the-fire investigation of all fires, with follow-ups whenever they are needed. "It is generally agreed," he said, "that at least 50 per cent of the origin of all fires is established before the fire is extinguished." Suggestions are that the State fire marshal or the State insurance commissioner have a representative in each community delegated to respond to all fire calls, and that "it would be perfectly proper" for the fire insurance companies to maintain operatives to respond to alarms, "for the specific purpose of investigating during the progress of such fires the origin." Commissioner Smith also declared his belief that the payment of losses should "be withheld pending

investigation... until such investigations have been brought to an issue, disclosing either criminal, or whatever responsibility that may be, chargeable in the premises." He cited as proof of the need of such safeguards against fraud cases where water damage rather than heavy fire loss was claimed, when as a matter of fact the fire had been extinguished without the application of water, by blankets, chemicals, or other devices.

On Saturday, September 24, George H. Nettleton, State Fire Marshal of Minnesota, read a paper on "Loss of Life from Fire and How It Can Be Minimized." The measures he advocated were as follows:

1. A Building Code to secure safe home, school and general safe construction.
2. The introduction of the subject of fire prevention into the public schools.
3. The observance of a national Fire Prevention Day.

Aircraft Registration for Canada

AMERICAN aircraft flying into Canada now is considered by the Canadian Air Board to be adequately registered when it bears the registration mark of Underwriters' Laboratories. This does away with the necessity of a mark beginning with "C" for such craft, previously required to be assigned by the Air Board of Canada.

First Aid Contest for Miners

THE Lytle Coal Company recently conducted at Minersville, Pa., a demonstration of first aid for miners injured, and a contest for those proficient in first aid. Prizes were awarded by the company.

Hand Labor Accidents

OVER half of the American Smelting & Refining Company's accidents are known as Hand Labor Accidents, caused in many instances through failure of the workman to properly handle his work because he has not been instructed in the right and wrong of it. A sixth are due to burns. One out of every ten are eye accidents, caused by flying chips, dust or hot metal, and about the same number of accidents are caused from falls. Six per cent are known as railroad accidents —that is, where the employes have been hurt while working about the cars, or motors.

Fire Prevention Lessons

SANDUSKY, Ohio, is to have fire prevention taught in all public and parochial schools by fire department officers, who are to be assigned at regular intervals to give such lectures at the schools. Factories and hospitals are to be visited for similar lectures.

Automobile Noise Regulation

THE New York City Board of Health and the Department of Health on July 25 passed a resolution amending the Sanitary Code to prohibit "loud and explosive noises" caused by automobiles and other motor vehicles. This makes obligatory the discharge of engine exhausts into mufflers or similar devices, and specifies that the use of the horn shall be only "in a reasonable manner as a danger warning."

Health Experiment for Ohio

A FIVE-YEAR demonstration in public health work for children is to be staged by the National Child Health Council at Mansfield, Richland County, Ohio. Eighty communities competed for the privilege of being the scene of this experiment, which it is anticipated will be not only of great benefit to the individual community, but also of use as a pattern for work along similar lines throughout the country. Dr. Walter H. Brown, of the Rockefeller Foundation's Commission for the Prevention of Tuberculosis in France, has been appointed to head the Mansfield experiment.

Mansfield is a city whose population is estimated at 28,500, and was the subject

of one of the recent reports of the Committee on Fire Prevention and Engineering Standards of the National Board of Fire Underwriters. One of the conditions that will have to be met at the outset by any health undertaking is an "inadequate and not entirely reliable" water supply, which is a drawback to public health as much as to public safety from fire. Mansfield seems a good selection, however, to serve as typical of what results can be secured and what handicaps are to be overcome in health work in the average American community. It contains a fair proportion of industrial population, having factories for the manufacture of agricultural machinery, steel and brass works, stove, electrical apparatus, and plumbing equipment factories.

Business Depression and Fires

WHETHER or not it can be proved as an increase in moral hazard, the increase in number of fires in certain classes of business as shown by the annual report of the New York City Fire Department for 1920 bears a strangely coincidental likeness to a list of businesses hit by the slump in retail buying. There was an increase of 400 per cent in the number of fires in the embroideries and laces business from 1919 to 1920; likewise 385 per cent in shirts, 360 per cent in woolen and worsted goods, and 320 per cent in paper boxes, while women's clothing and women's and children's furnishings tied for fifth place among the increased fires with 229 per cent of their 1919 totals. Fires in electrical supply and fixture houses increased 170 per cent, and were followed by two others of the clothing group. The cloak and suit trade tied with pool rooms and billiard parlors at 117 per cent gain on their 1919 fires. Chief Kenlon's analysis of the figures does not indicate whether the increase was evenly distributed throughout the year, but *Fire Protection* suggests that a further analysis of these figures might show a large proportion of the increase in number of fires in these classes in the latter part of 1920. No comprehensive figures are yet available for 1921.

Safety Topic of Managers' Meeting

THE Interstate Public Service Company of Indiana conducted, September 27, at Shelbyville, Ind., the first of what is planned to be a regular series of annual meetings for its department and plant managers and foremen. Safety in plant operation was the keynote of the meeting and the subject of many of the talks and demonstrations. Speakers included L. A. Gutting, chairman, James Harmon, L. D. Sprague, C. C. Argabrite, C. H. Dallow, George O. Stewart, G. J. Ogleby and I. L. Frost.

New York Automobile Accidents

PERSONS killed by automobiles in New York State in the first eight months of 1921 numbered 1,072, according to a report of the National Highway Protective Society. This is a total one-third higher than that of the same months of 1920. In August alone 217 persons were killed, of whom 79 were in New York City. Motor trucks are regarded by the society as a mounting menace to public safety.

Limestone Dangers Increase

THE accident rate of limestone quarries in the United States in 1920 was 2.58 killed and 143.11 injured per each thousand men employed inside and outside the pits. The corresponding rates for 1919 were 1.97 killed and 134.05 injured. The reports for 1920 show that 96 men were killed and 5,321 injured, or 31 more deaths and 890 more non-fatal injuries than occurred in 1919.

Accidents inside the quarries alone caused 74 deaths and 3,590 non-fatal injuries, while those occurring outside the quarries resulted in 22 deaths and 1,731 injuries. The accident rates for the quarries proper were 3.02 killed and 146.67 injured per thousand employed, corresponding with rates of 2.24 killed and 136.44 injured for the previous year. For the "outside" works the rates were 1.73 killed and 136.25 injured, as compared with 1.40 killed and 129.04 injured in 1919.

The largest increase in the injury rate was in that for Kentucky, where there were 52 more injuries for every thousand persons employed in 1920 than in 1919. Other increased rates were Pennsylvania, Illinois, Ohio, and Alabama.

Of the principal limestone-producing States, the following showed decreases in accident rates during the past year: Michigan, Texas, West Virginia, Virginia, Maryland, Indiana, Missouri, Oklahoma, and New York. Michigan showed the most notable reduction in the accident rate, the decrease in the number injured being equivalent to 66 for every thousand men employed.

Considered by causes, practically all classes of injuries occurring inside the quarries were more numerous than in 1919, except in the case of falls or slides of rock or overburden, which declined from 349 to 322, and injuries resulting from burns, which fell from 70 in 1919 to 59 in 1920. The net increase in injuries occurring inside the quarries was 538. The net decrease in accidents at the plants outside the quarry pits was 352, and the only injuries showing a decrease were those caused by handling rock by hand, which fell from 83 to 40. Accidents from electricity at the outside works injured 26 persons, the same number as in 1919.

Safety in Automotive Industry

F. K. HENDRICKSON, chief engineer and designer of the Reed-Prentice Company, Worcester, Mass., is the author of the following statement concerning the development of safety devices in machine-tool building for the automotive industry: "The working forces of automobile factories comprise many who never saw a machine tool prior to their employment, and it is this class of help that has made it necessary to safeguard every moving part of a machine to prevent them from getting injured. Years ago gears were left exposed and shafts allowed to run in the open, but the machines of today must include guards over every part that is in the least dangerous. Projecting shafts must be guarded, and where it is impossible to supply guards as part of the machine, rails or nettings must be secured around the machine to prevent any possibility of injury."

The successful machine-making elements credited by Mr. Hendrickson, speaking before the American Society of Mechanical Engineers, with development to meet the demands of the automotive industry were as follows:

1. Materials and their proper distribution
2. Precision and specialization
3. Power
4. Manipulation
5. Speed
6. Lubrication
7. Safety devices.

Brushes as Anthrax Carriers

THE Department of Health of the City of New York examined in 1920 many brushes suspected of having caused anthrax in human beings. Thirty-three cases were reported as positive for anthrax, after tests which obtained a complete proof of cultural characteristics, morphology, and virulence.

Out of these 33 brushes, eleven were definitely known to be horse hair. The others had no label or history when sent in. Five of the samples were labeled "imported." Two of the cases were isolated from the lesions of patients suffering from anthrax.

Owing to the great resistance of anthrax spores and the dangers involved in handling such infected material too much emphasis cannot be placed on the needs for using precautions and safeguards.

Safety Educational Work

THE Safety Engineering Department of Employers' Mutual Liability Insurance Company is responsible for a series of safety posters issued regularly to its members for bulletin board posting through the office of the director of safety educational work. The latest posters deal with such safety topics as goggles, retarding sparks, first aid for slight injuries, and general alertness to avoid accidents.

Construction Danger in Salamanders

INSUFFICIENT safeguards on salamanders used in building construction are reported as having caused seven fires in one month among the policyholders of the Boston Manufacturers Mutual Fire Insurance Company. The company has sent out the following precautionary instructions:

Not only should fire pails and extinguishers be kept available in such buildings, but provision should be made by which contractors and others will not be allowed to burn waste wood or rubbish in these stoves. Coal or coke should be used in every case. Excellent order and neatness should be maintained in their vicinity and all stoves placed in the care of a watchman constantly on duty.

A Well Protected Plant

THE East Waterway Dock & Warehouse Company of Seattle, Wash., in an artistic booklet, describes for commercial purposes the aim and facilities of its organization. Space is devoted to the fire protection of the property. The warehouses are protected at exposed points by a 13-inch solid brick wall. A sprinkler system, costing $75,000, is fed by 3 separate water supplies, and both hydrants and portable extinguishers are closely located. The oil terminal is watched by 40 men equipped with 10 40-gallon and 75 3-gallon extinguishers and buckets of bicarbonate of soda stand everywhere. Work has recently been completed on a 50,000 gallon water tank.

Requiring Schools to Teach Safety

THE State Legislatures of California, Ohio, Rhode Island, West Virginia and Wisconsin have, during the last session, passed bills making the teaching of fire prevention in schools and colleges compulsory. New Jersey did so a year ago.

The campaign to secure such legislation as these bills was sponsored by the National Association of Credit Men, and the textbook to be used in all these States is "Safeguarding the Home Against Fire," a manual prepared by the National Board of Fire Underwriters.

National Health Organizations

THE first interstaff dinner of the National Health Council was held at Keen's Chop House, New York, October 18, marking a further step in the successful co-ordination of many of the national health organizations whose headquarters are in New York, and whose membership comprises approximately 7,035,000 persons.

Among those who attended the dinner were Dr. Donald B. Armstrong, acting executive officer of the National Health Council; Dr. William F. Snow, general director of the American Social Hygiene Association; Dr. Lee K. Frankel, third vice-president of the Metropolitan Life Insurance Company; Dr. Charles J. Hatfield, managing director of the National Tuberculosis Association; Miss Sally Lucas Jean, director of the Child Health Organization of America; Miss Florence M. Patterson, director of the National Organization for Public Health Nursing; Dr. Thomas W. Salmon, medical director of the National Committee for Mental Hygiene; Dr. L. Emmet Holt of the National Child Health Council; Owen R. Lovejoy, general secretary of the National Child Labor Committee, and A. W. Hedrich, secretary of the American Public Health Association. Many other important organizations were represented.

The co-ordination of the work of so many large organizations whose interests extend into every community in this country has been studied with keen interest by health authorities both here and abroad.

Cancer Curable in Early Stage

THE National Safety Council, through its Health Service Section, is spreading information concerning cancer, and has published the following notice widely:

"One out of every 10 persons over 40 dies of cancer. Cancer is curable if treated early. The American Society for the Control of Cancer says: 'Cancer begins as a local disease. If recognized in time, it can often be completely removed and the patient cured. If neglected, it spreads through the body with fatal results. No medicine will cure cancer Early diagnosis is all important, but pain rarely gives the first warning."

Safety-First Association in Australia

AN organization meeting to inaugurate a Safety-First Association in Australia was held June 30, 1921, in Sydney, New South Wales. The Hon. George Cann, M. L. A., Minister for Labor and Industry and also Minister for Mines, acted as chairman, and in opening the meeting remarked that the two Departments which he administered were responsible for "The Factory and Shop Act," "Scaffolding and Lifts Act," and the "Mines Inspection Act," besides which they had a draft ready for a "Boiler Inspection Act;" all of which had to do with the safety of the worker. The Government of New South Wales would do all it could to help conserve human life. He called on Mr. F. Danvers Power, convener of the meeting, who stated the object in calling the meeting was "to bring those interested in the safety-first movement together, and to interest others in the subject, with the intention of forming a Safety First Association in Australia."

Mr. Danvers Power's address follows:

The advantages of co-operation, which is only another name for team work, are well known. There are expressions in common use, such as "United we stand, divided we fall," "Two heads are better than one," which indicate this. The accumulated knowledge and influence of members of such an association should make itself felt in the community, and its members could assist the country by carrying out a class of work which does not come within the range of Acts of Parliament or under the supervision of inspectors.

Safety First is not a fad of idealists: it has passed the experimental stage, and has proved successful in practice. The operations of the National Safety Council in the United States of America and of the British Industrial Safety First Association have shown what can be accomplished, and demonstrate that there is ample scope for such associations. One of the great advantages of such an organization is that it represents all interests, including the public, so cannot be justly accused of being formed for any particular class. The constitution of the National Safety Council states that its objects are "to promote the conservation of human life—the safety, health and welfare of the individual, the workman in the industries and the public generally, particularly as relates to the prevention of accidents and vocational diseases and the subject of industrial sanitation."

Everyone is liable to accidents, if not due to omissions or commissions on his own part, possibly due to those of others. One cannot work against the so-called laws of nature with impunity. Most accidents are unnecessary, and the number of fatal, permanent and temporary accidents can be largely reduced by suitable propaganda. The number of fatal accidents in New South Wales, not counting suicides, are fairly regular and the victims would fill this hall nearly five times over. That means so much pain and misery, not necessarily to the victim, whose death may be instantaneous, but to his friends and relatives, especially those dependent on him, and those who may be responsible for the accident.

The activities of a Safety First Association are varied and numerous, and in consequence offer scope for anyone willing to take a hand, no matter what his trade or profession may be or whether he has one. These activities should be carried on through the home, schools, churches, industries, public utilities, civic organizations and any other agency which has for its object the development of a community.

Safe conditions and practices can be promoted by the following measures:

1. Organizing safety-first departments in the factories and shops of members who wish it.
2. Drawing up laws and regulations in connection with safety.
3. Collecting literature and other information in connection with safety.
4. Educating the public by means of lectures, lunch hour talks to workmen, addresses to children in schools, and the exhibition of movies showing safe and unsafe practices.
5. Publishing and distributing pamphlets and posters.
6. Promoting safety-first weeks and exhibitions.
7. Forming classes for training foremen and others in the principles of safety-first.
8. Forming committees for the study of various subjects in connection with safety matters; some of these would be permanent, such as that for collecting and analyzing statistics of accidents; others would be temporary, or might be re-opened from time to time in order to bring the information up to date in the light of increased knowledge, e.g., certain classes of accidents, accidents peculiar to some particular industry, or some special subject such as lighting, ventilation or miner's complaint.

In connection with lighting, for instance, one might consider the effect of direct light, glare, specular reflection, also sharp contrasts as between deep shadows and strong light which contribute to accidents; as compared with the beneficial effect of diffused light, proper direction of light, correct intensity of light, use of reflectors, shades, and the suitable illumination of dangerous places.

It is recognized by everyone that certain physical defects make a man unsuitable for some particular kinds of work. For instance, a man who is short-sighted or color-blind would be a danger to himself and others, were he employed as a locomotive driver; neither would he be efficient as a painter and decorator. The physical build of a man, even if he is otherwise fairly sound, may under certain circumstances be the cause of accidents when working under normal conditions, such as

when a man with short limbs, which affect his radius of activity, is unable to reach things conveniently without moving bodily from his station.

It is also recognized that the state of a man's health may unfit him for certain duties. For instance, a man with lung trouble should not work in a quartz mine, or in a place where he is liable to catch cold.

The mind of a man varies as much as his body, and we all know the way in which the mind and body interact. Putting aside a man's intellect, we have to consider his temperament and how that affects his calling. Some grasp big ideas; others are better at details. Placing a man at uncongenial work, and his consequent lack of interest, are often the causes of accidents. Some people can repeat the same class of work over and over again, while others find it so monotonous that they become careless, and an accident results. Fatigue, mental and physical, is another fruitful cause of accidents and thus becomes a subject for study.

Mr. David Cumming, Director of the Railway and Tramway Institute and head of the safety-first movement in connection with the railways, described how the system worked, and mentioned how accidents had been reduced since safety-first had been adopted. He claimed that the Railway and Tramway Department was the pioneer of safety-first in New South Wales.

Chief Officer Sparks, head of Fire Brigades in New South Wales, gave a list of the various causes of fires in the province and the number of cases during the year that came under each heading. He also explained how such fires might be avoided, and what to do when the clothes of a person caught alight.

Traffic Superintendent Black referred to the narrow badly-laid out streets of Sydney, and remarked that the passenger traffic in the lifts of the city buildings was ever so much greater than the vehicular traffic of the streets. He announced that the "Keep to the left" rule would come into force the following day, and replace the old "Keep to the right" rule.

Mr. John Sulman, architect, well known in Australia in connection with town planning schemes, also made references to the narrow streets of Sydney, and suggested that as a matter of safety in case of fire, the space between opposite buildings might be bridged across. He also said that buildings over four stories should be built fireproof, the steep roofs to be found in and about Sydney are quite unnecessary as there is never any snow, and they add to the danger of those who build and have to repair them.

Dr. J. Purdy, Metropolitan Medical Officer of Health, spoke of the good work done by the fire brigades, traffic police, and surf life-saving teams in reducing the number of accidents due to fires in the streets and from drowning. There is a large field open in connection with industrial disease, in which much research work has already been done both in the United States and Great Britain. It has been shown that fatigue is the cause of many accidents in certain employments where accidents were more frequent towards the end of the day's work. In Great Britain they have an excellent museum in which are illustrations of discases connected with certain industries; it also contains illustrations and models of the more common accidents, and the methods adopted for preventing injury and death in the industries. Dr. Purdy suggested that in connection with the new Technical College to be established at Darlinghurst (Sydney), a special building should be erected as a museum for hygiene, sanitation and safety-first.

The following gentlemen were appointed as a committee to draft a constitution and by-laws to be submitted to a full meeting at a later date: Messrs. A. E. Heayden, Chief Mechanical Engineer of the Railway Department and practically the father of the safety-first movement on the railways; J. P. Tivey, electrical engineer; A. J. Fisher, of Fairbanks and Morse; P. A. Fildes, Departmental Engineer and Chief Inspector of Scaffolding and Lifts for the Department of Labor and Industry; R. J. Perdriau, professional clerk for the Department of Labor and Industry; and F. Danvers Power, mining engineer, appointed Hon. Secretary.

[*This report specially contributed to* SAFETY ENGINEERING *by F. Danvers Power.*]

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

G. E. Sanford, Pres. C. Van Horn, Treas.
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Regular Meetings—Fourth Friday of Each Month from September to June at 8 P. M.

PROCEEDINGS OF THE SEPTEMBER MEETING

THE regular monthly meeting was opened by President G. E. Sanford, who announced that all members of the American Society of Safety Engineers attending the National Safety Council Convention at Boston would hold a dinner at the Hotel Victoria.

The purpose of the meeting was the discussion of National Ladder Code, and the meeting was turned over to Charles N. Young, Chairman of the Ladder Committee. The first speaker was F. A. Davidson, of Dwight P. Robinson & Co., who read a very interesting paper, "The Need of a National Safety Code for Ladders." His paper cited the necessity of having ladders made of certain materials as well as for special purposes. Figures were given of ladder accidents in 1919 in California, one of the few States having any records of the ladder accidents for that year. Mr. Davidson said that every means should be used to provide good ladders which would reduce the number of injuries.

M. C. Goodspeed of the General Electric Company, who prepared the draft of the National Code, read a paper on how the materials for the different parts of the ladders were selected, and how the dimensions were figured.

After Mr. Goodspeed's interesting paper Mr. Young spoke of the desirability of making the code suit all States. New York and Pennsylvania are the only States at present having any code on ladders.

Mr. Sanford spoke of the advantage of having the code national; this will help the companies doing business in different States by giving them a standard to follow.

Dr. C. B. Connelly of the State of Pennsylvania Department of Labor and Industry sent a paper entitled "The Essentials of a National Safety Code for Ladders." In the absence of its writer this paper was read by Fred J. Hartman, Secretary of the Pennsylvania Industrial Board. The State of Pennsylvania started two years ago to revise thirty codes on as many subjects. The reason for formulating a National Ladder Code was that it could be used as a basis for a code for any State. The national code should cover ladder usage in all the different industries of the country.

Mr. Kehun of the Industrial Commission of Wisconsin made a few remarks in favor of having codes which could be enforced, and so would actually reduce the number of accidents.

Mr. W. S. Paine of the Aetna Life Insurance Company spoke of the Education of the people who would live and act safety beyond the law, and not by law enforcement.

Short talks were made by the following: Mr. Conover, President, Mason Builders, New York City; Mr. Dixon of Turner Construction Com-

pany, who objected to the section in the New York State Ladder Code restricting the use of cleat ladders; Jesse Larimer from Lumber Mutual Insurance Company, who admitted the desirability of a suitable code, but was in doubt about the willingness of the users of ladders to follow the instructions of the code; and Mr. James of the New Jersey Zinc Company, who spoke on the benefits of complying with good ladder codes.

W. E. CRIPPEN,
Member of Publication Committee.

A. S. S. E. DINNER AT BOSTON CONGRESS

THE Boston members of the American Society of Safety Engineers, together with visiting members from other parts of the country, held an informal dinner at Hotel Victoria, Boston, on Tuesday evening, September 27, 1921, during the Tenth Annual Congress of the National Safety Council. President G. E. Sanford of the Society presided at the meeting.

There were no set speeches scheduled, but the entire meeting was thrown open for a general round table discussion on the subject "Engineering in Accident Prevention." Among the speakers were the following: Drs. Lucian W. Chaney and M. G. Lloyd of Washington, D. C.; H. Weaver Mowery, Junior Past President of the Society; George Oliver Smith, Senior Vice President of the Society; M. C. Goodspeed of the General Electric Company, Erie, Pa.; J. A. Robinson of Providence, R. I.; Dr. A. D. Risteen of Hartford, Conn.; J. I. Banash of Chicago; and C. F. Horan of Watertown, Mass.

Representatives were present from seven States and the District of Columbia. The opinion was voiced that such round-table gatherings were of extreme practical value, both from the personal engineering help attained and from the cordial spirit of good-fellowship which prevailed.

COMMITTEE ON EDUCATION

AT the September meeting of the Board of Directors a resolution was passed approving the preparation by the Committee on Education of copy for a textbook or an outline of lessons for a Standard Course in Safety Engineering. The committee has been at work along these lines, and is to submit copy to the Executive Board. J. A. Robinson of the Grinnell Company, Providence, R. I., is chairman of this committee, and suggestions may be addressed to him direct.

PROGRAM OF OCTOBER MEETING

SUBJECT: "Purposes and Results of Inspection Work from an Insurance Standpoint."

Speakers: W. J. Venning, Supervising Safety Engineer, Aetna Life Insurance Company; J. G. Shaw, Supervising Inspector, Travelers Insurance Company; George McAinsh, District Manager, Engineering Department, American Mutual Liability Insurance Company.

Place: State Museum of Industrial Safety and Sanitation, 571 Jersey avenue, Jersey City, N. J.

The New Jersey State Department of Labor has invited the Society to come to the Museum, which is near the Grove Street Station of the Hudson & Manhattan R. R. (tube) to view the complete lighting exhibit installed under the auspices of Professor C. E. Clewell of the University of Pennsylvania, and many exhibits illustrating sanitary requirements, lunchroom installations, hospital equipment and a full range of safeguards for factory requirements.

The program will include two moving pictures: "The Rehabilitation of Injured Workmen of New Jersey," and "Knights of the Crossroads."

COMPRESSED AIR SAFETY CODE

THE American Society of Safety Engineers was invited by unanimous vote of the Executive Committee of the American Engineering Standards Committee on September 15 to act as sponsor for the Safety Code for Compressed Air Machinery. This code is to include rules for the construction and use of compressors, tanks, pipe lines and the utilization apparatus where compressed air is the active agent.

DIRECTORS' MEETING

THE Directors of the American Society of Safety Engineers will meet at 3 p. m., October 28, preceding the regular monthly meeting that evening at 8 o'clock. The Directors' meeting will be held at the headquarters of the society, in the United Engineering Societies Building, 29 West 39th street, New York, N. Y.

NOMINATING COMMITTEE

THE following members have been appointed to serve on a committee to bring in nominees for the executive offices of the American Society of Safety Engineers to be vacant during the coming year: J. P. Alexander, General Electric Company, 120 Broadway, New York City; E. D. Haggerty, Employers Mutual Insurance Company, 61 Broadway, New York City; James G. Shaw, 30 East 42d street, New York City.

LADDER CODE

THE September meeting of the society was devoted to the Ladder Code, a tentative draft of which appears in full in the August issue of SAFETY ENGINEERING. Papers on the various phases of the subject were read by F. A. Davidson of Dwight P. Robinson & Company, M. C. Goodspeed of the General Electric Company, and, in the absence of Commissioner Connelley of the Industrial Board of Pennsylvania, by F. J. Hartman, Secretary of the Industrial Board.

The provision requiring cleats to be bolted and housed into side rails of ladders was criticized. It transpired that the insurance companies are taking steps to secure an improved classification of accident causes; this is expected to throw some light upon the reason for this and other provisions of the code as proposed.

The code now goes to the Sectional Committee, where it will receive a thorough review and such revision as the broader experience of that committee may deem suitable.

AERONAUTICS CODE COMMITTEE

HAROLD M. HINE, appointed as the representative of the American Society of Safety Enginers on the Sectional Aeronautics Code Committee, is unable to continue on the committee, and N. M. DuChemin has been appointed delegate, to succeed Mr. Hine. Mr. DuChemin is exceptionally well qualified by actual experience to take an active part in the formulation of this code. Communications may be addressed to him in care of the General Electric Company, West Lynn, Mass.

A CORRECTION

IN the article "Safety Features in High Tension Generating Stations and Substations," by M. M. Samuels of the J. G. White Engineering Corporation, prepared for and read at a meeting of the American Society of Safety Engineers, as published in the September issue of SAFETY ENGINEERING the title of C. D. Gray is incorrectly given. Mr. Gray's title is Chief Electrical Engineer.

SAFETY ENGINEER WANTED

By prominent compensation insurance company (eastern location). Applicant should be 25 or 30 years of age, preferably technically educated. Must have energy, enthusiasm and sales ability. Good opening, with future, for right man. Give experience and send recent photo, which will be returned. Box 12, SAFETY ENGINEERING, 126 Maiden Lane, New York, N. Y.

Fire and Accident Prevention Day

THE anniversary of the Chicago fire is coming every year into more general observance as Fire Prevention Day. More than the day, the week which that day opens is being utilized for educational work along the lines of fire prevention. Coupled with the growing sense of responsibility for preventable fires in the public conscience is a parallel ambition to reduce all other preventable accidents. Some communities have organized their Fire Prevention Week to include accident prevention in general, while some have designated separate dates to be observed officially as Accident Prevention Week.

The observance of these periods of concentrating the attention of the public on its own safety has been more widespread and enthusiastic this year than ever before. The National Board of Fire Underwriters and the National Fire Protection Association gave impetus in large measure to the observance of Fire Prevention Day and Week. Various organizations have joined in recent months to arouse interest in Accident Prevention Week, whose dates have not reached any general agreement.

The Governors of various States issued proclamations making Fire Prevention Day an occasion of official note. The mayors of cities followed the suit of the Governors and the host of intermediate officials who did likewise. Few men in public life refused their support to this movement, and most of them lent aid and co-operation to make the object of the occasion as important as might be to their constituencies.

PARAMOUNT STARS POSE FOR OCCASION

New educational features of Fire and Accident Prevention Day, this year, were pictures posed by Paramount stars. Three of them appear on other pages in this number of SAFETY ENGINEERING. Lila Lee shows how 23,000 persons have been burned to death in the past five years. "Better to wear dirty gloves than to do what Lila Lee is doing, using gasoline in an open dish inside." Declaring that 23,000 persons have met death in that way within the past five years, President John B. Morton of the National Board of Fire Underwriters, explained: "Never use gasoline inside the house for cleansing purposes. In a closed space there are two ways fire may be caused. One is by static electricity caused by the friction of the gloves themselves. The other comes when the heavy gas vapor leaps across the exposed flame of a kitchen range."

Fire Chief Scott of Los Angeles, Lois Wilson and two juvenile picture players illustrated the danger of allowing children to play with matches. "Hundreds of children are numbered among the thousands of unfortunates who die yearly through fires caused by matches," is President Morton's comment.

Another picture relates to cigarettes and matches. Thomas Meighan says to Conrad Nagel: "Stop! Put that in the ash tray!" President Morton informs the public that cigarettes and matches, carelessly thrown into waste baskets or out of windows, have caused fires resulting in $14,000,000 damage and the loss of 7,000 lives each year.

MANHATTAN BUREAU OF BUILDINGS CONSIDERS FIRE DANGERS

In New York City, the Bureau of Buildings of the Borough of Manhattan observed Fire Prevention Day on Monday, October 10, by a meeting which was addressed by Rudolph P. Miller, Superintendent of Buildings, and by Harry E. Newell of the National Board of Fire Underwriters. The subjects dealt with were spontaneous ignition, dust explosions, hangar construction, toxic gas plants, and the oil pollution of rivers and harbors.

The slogan of the Massachusetts "No Accident Week," which was observed September 25-October 1, under the supervision of Colonel Alfred F. Foote, State Commissioner of Public Safety, was "Don't get hurt." Many pastors dwelt upon the topic in their sermons on the opening day. Posters were distributed, "no accident" tags were placed on milk bottles, and safety talks were given to school children.

In and Out of the Safety Congress

THE Tenth Annual Safety Congress of the National Safety Council began at 10 a. m. Monday, September 26, in the State Capitol, Beacon Hill, Boston, with every motorist in the city sounding his horn for "Safety First." At the same moment, every boat in the harbor blew its whistle, while factories shrieked their sirens.

* * *

All taxis in the city bore in scarlet the legend: "DON'T GET HURT!" For the week was not only the week of the meeting of the Safety Congress, but also Massachusetts Safety Week, during which more than 500,000 school children, under the direction of the State Council and the State Supervisor of Safety, were to be given instruction suitable to their ages in all that makes for safety. The idea of safety was to be enforced on the minds of all the people of the Bay State and the States of the Union.

* * *

Spectacular incidents and events happening wholly outside the historic old State House began when John Hart of the Minneapolis police force claimed that, so far in his career, he had heard 25,000 (exactly) excuses for violating speed laws. But the one for which he awarded the prize was that of a man who averred that the wind blew his car ahead of a street signal set against him!

* * *

Followed, then, other occurrences of interest, wholly apart from the staid discussions taking place in every nook and cranny of the State House. Some of them had little bearing except incidentally, and wholly unpremeditatedly, on the official proceedings.

* * *

Lewis E. McBrayne of the Massachusetts Council came out with the bold statement that in the Bay State most accidents are now caused by wood alcohol, administered internally. He indicated how "moonshine" formed formaldehyde, resulting in blindness. But he gave no constructive information on the question of how to make this substance perfectly safe.

Captain George A. Parker of the State constabulary put his men through safety stunts on the Common, such as first aid of all kinds. Also he had them perform motorcycle escapades of various sorts, just as they might have to do when chasing bootleggers. This happened on the Common playground at noon, and everybody, including H. Weaver Mowery, was there. Suddenly Sergeant Charles T. Beaupre skidded and overturned, the motorcycle landing on top of him, but he emerged from the incidental accident without a scratch. Lucky Sergeant Beaupre!

* * *

In welcoming the delegates, Governor Cox said he was sure that one result of the Safety Congress would be to get tangible suggestions for preventing accidents. He congratulated the delegates on their concerted effort to attract public attention to the necessity for carefulness.

* * *

President Tolman, before an auditorium meeting, attended by practically every delegate, called attention to the growth of the National Safety Council, saying that its membership now comprised industrial institutions employing 6,000,000 men. He cited instances where accident records had been kept, after one particular concern had become a member a 75 per cent decrease in its accidents resulted.

* * *

An unfortunate feature of the Congress was the limited space at the State House. Visitors hunting exhibits were required to find them (if they could) in rooms in the nearby hotels.

* * *

On the first day at the general meeting, a resolution was passed which is of importance to safety people, and to the entire public. After referring to the 80,000 accidental deaths annually in this country, fully 75 per cent of which are preventable, the National Safety Council put itself on record advocating:

1. The safeguarding of all dangerous machinery and places according to methods that have been found practical and effective.
2. The re-designing and reconstruction of

factory equipment when necessary, and the improvement of dangerous processes for the purpose of removing the accident hazards and at the same time increasing industry efficiency.

3. The education of all workmen and their supervisors in safe methods and habits of work.

4. The safety education of all school children, as well as students at our colleges and universities, not only for their own safety but to stimulate interest in the conservation of life, and a better citizenry; and

5. The mobilization of all community forces, including city and State safety councils, for intensive and permanent campaigns against accidents of all types.

At the close of the meeting five employes of the Bell Telephone Company at Camden, Pa., gave an excellent demonstration of first aid treatment in accident cases.

* * *

Having, during the day, taken complete possession of the State House, its grounds, the hotels and the immortal Boston Common, the delegates proceeded in the evening to the theater, or their hotels, to prepare for the second big day of the National Safety Congress.

* * *

On Tuesday a feature of interest to everyone was an exhibition by two Boy Scouts of the methods of inducing artificial respiration. They showed effectively the application of the hands to the back of the victim at the point of the floating ribs, the victim lying prone upon his face. The exertion downward, the pressure, and then the release were so perfectly exemplified that it would be difficult for a person who witnessed the demonstration to forget the methods.

On this occasion Colonel Foote, Safety Director of the State, urged everyone to be "his brother's keeper." And Dr. E. P. Jones, mentioning an accident at Kingston the previous day (Monday) in which four children were electrocuted, said that if one person had been present who knew either of the Schaefer methods of restoring animation, some of the children's lives might have been saved.

* * *

The accident mentioned above was a topic of considerable comment on the part of delegates, almost any one of whom could have promptly acted in the case if he had been present. To prevent anything of the sort occurring again during Safety Week, the *Boston Herald*, in its issue of September 28, made this announcement:

"Should there be another case of drowning, electrocution or asphyxiation in or near Boston while the safety experts are in session, which will include Friday, the officials of the Congress desire that an emergency call be sent to the registration desk."

* * *

Yet, as proof that "accidents happen in the best of families," somebody in Room 222 of the State House, Wednesday morning, is said to have dropped a lighted cigar or cigarette on the floor. This is the Judiciary Room of the State House where the Public Utilities Section was in session. The carpet caught fire from some cause or other. The fire was extinguished by an attendant before much damage was done. But Boston newspapers commented on the occurrence.

* * *

The election as president of the National Safety Council of Arthur H. Young of Chicago, manager of industrial relations for the International Harvester Company, came as a distinct surprise to him, for he was ill at his home in Chicago. Election of other officers was delayed until he should be able to meet with the executive committee.

* * *

The new president needs no introduction in the safety field. He has been active and very prominent in the work of industrial accident prevention since the beginning of the organized safety movement. He has served great manufacturing corporations as director of safety. For several years he was director of the American Museum of Safety in New York City. SAFETY ENGINEERING has had frequent occasion to commend Mr. Young and his work. He has been an earnest and enthusiastic member of the National Safety Council since its foundation. Of his connection with the Illinois Steel Company, this magazine said in December, 1916:

"Arthur H. Young started his business career at the age of 13 as a messenger boy in the company of which he is now supervisor of labor and safety. Step by step he went up the ladder as leverman, assistant in the chemical laboratory, timekeeper, payroll clerk, statistician, assistant supervisor of labor and super-

visor of labor and safety, having charge of all the plants of the Illinois Steel Company in its activities in accident prevention, personal injury settlements, employment, fire, police, plant cleanliness, sanitation, plant restaurants, visiting nurses, and other welfare matters, including pensions. In addition, his duties included the administration of discipline and review of all cases of discharge by superintendents and foremen, all complaints of improper working conditions or equipment, with full power to make any necessary adjustments. The department under Mr. Young's charge strove by every honorable means to bring about the closest contact between the officials and the men working in the plants

"Many other large industrial institutions have organized their labor and safety departments along the lines of the Illinois Steel Company. The United States Government, State factory inspection bureaus and many industrial concerns have used the safety campaigns of the Illinois Steel Company as models in organization detail."

So the National Safety Council's new executive is well fitted to his job. We wish his administration every possible success.

* * *

The resignation of General Manager Price was keenly opposed, but he was insistent, desiring to enter business for himself.

* * *

The sessions of the Public Safety Section were saddened on account of the death of Dr. Frederick S. Crum, assistant statistician of the Prudential Insurance Company, chairman of the statistics committee of the section. Dr. Crum met his death by drowning in Maine on September 2. However, he had prepared his report and it was read at the meeting.

* * *

Wednesday evening had its amusing features. During the week the police had required everyone to walk on the sidewalk instead of the street—a thing difficult to do in Boston, as we all know. So a demonstration "arrest" of a "jaywalker" was staged at the corner of Boylston and Tremont streets as a warning to the crowds passing that point. Music for the event was provided by the United Machinery Company's band from Beverly.

* * *

Thursday, hot and humid: temperature 79, humidity 85. If you were there you know. The principal topic of the day's lobby conversation was a statement made by F. M. Wilcox, chairman of the Wisconsin Industrial Commission, who in addressing the general session, stated that all industrial employers should be held responsible for diseases contracted by persons in their employment. This was approved by some, but there was a divergence of opinion.

* * *

One of the chief disappointments of the entire week was the failure of President Harding's personal physician, Brigadier General William A. Sawyer, to appear. He was to have presented a paper, Thursday, on "Health of Industrial Workers and the Public Welfare." His paper was not read. It was explained that he was engaged on an official mission for the president. Most of the delegates had hoped to meet Dr. Sawyer, face to face, and see how he looked in his Sam Browne.

* * *

Up to Thursday, the "death hand" on the fatality clock on the Lawrence Building numbered only two accidental fatalities. This clock was of great interest to passers-by, and was a most effective way to impress the idea of carefulness on the general public. At first it had been expected to record all accidental injuries as they happened, but that did not prove feasible, as none but fatal ones were reported immediately.

* * *

Comment was caused by the remarks of D. L. Chase of Cleveland, editor of the *Railroad Trainman*, who casually remarked, at a joint meeting of the railroad and electrical railroad sections, that it was difficult at times for a man trying to "hit the ball" on his job to think of "Safety First." Under certain conditions he felt a man could not do so.

* * *

Altogether, it was a successful Congress, but one person can be in only one place at a time. So, with nineteen sections in active operation, one must wait for the full story until he gets the complete report of the proceedings.

Industrial Relations Conference
Harrisburg, Pa.
October 24-27, 1921

Under the Auspices of the Department of Labor and Industry, Commonwealth of Pennsylvania

FIRST DAY

Monday, October 24, 2 p. m.

Senate Caucus Room

MEETING OF THE APPROVED BOILER INSPECTORS OF PENNSYLVANIA.

Boiler Progress in Pennsylvania.—William P. Eales, of the Travelers Insurance Company, Hartford, Conn., and Chairman of th Boiler Board of Examiners of Pennsylvania.

Boiler Uniformity (Symposium).—Joseph F. Scott, Chairman, Board of Boiler Examiners, Department of Labor of New Jersey; C. O. Myers, Secretary-Treasurer, National Board of Boiler and Pressure Vessel Inspectors, Columbus, O.; Charles E. Gerton, Chairman, Uniform Boiler Law Society of U. S. A., New York.

Organization of Pennsylvania Board of Boiler and Pressure Vessel Inspectors.

Monday, October 24, 8 p. m.

House of Representatives' Hall

OPENING SESSION. Comimssioner C. B. Connelley presiding.

Address by Hon. William C. Sproul, Governor of Pennsylvania.

Address by J. J. Davis, Secretary of Labor, Washington, D. C. Topic: The Present Industrial Situation.

SECOND DAY

Tuesday, October 25, 9:30 a. m.

House of Representatives' Hall

INDUSTRIAL CO-OPERATION (The Four Factors in Industry).

The Employer.—(Speaker to be announced.)

The Employe.—John A. Voll, President, Glass Bottle Blowers Association of the United States and Canada.

The Public.—Geo. E. MacIlwain, Babson Institute, Mass.

The State.—Hon. Edward E. Beidleman, Lieutenant-Governor of Pennsylvania.

THE FOREIGN OUTLOOK.—Address by Dr. Frederick Willson, Reading, Pa.

Tuesday, October 25, 2 p. m.

House of Representatives' Hall

WOMEN AND CHILDREN IN INDUSTRY.

Employment of Minors.—Miss Mary Anderson, Director, Woman's Bureau, Department of Labor, Washington, D. C.

Employment of Women and Minors.—(Speaker to be announced.)

The Massachusetts 48-Hour Week vs. the 8-Hour Day.—Miss Ethel Johnson, Assistant Commissioner, Department of Labor and Industries, Mass.

Women and Welfare Work.—Miss Acheson.

Tuesday, October 25, 6 p. m.

Women's Club of Harrisburg

MEETING OF THE REPRESENTATIVES OF THE WOMEN'S ORGANIZATIONS OF PENNSYLVANIA.

Tuesday, October 25, 8 p. m.

House of Representatives' Hall

STABILIZING INDUSTRY AND EMPLOYMENT. Lieutenant-Governor E. E. Beidleman presiding.

(a) H. A. Hatch, Manufacturer, New York.

(b) Prof. H. G. Moulton, University of Chicago.

THIRD DAY

Wednesday, October 26, 9:30 a. m.

House of Representatives' Hall

INDUSTRIAL WASTE.

Unemployment.—L. W. Wallace, Executive Secretary, Federated American Engineering Societies, Washington, D. C.

Industriel Disputes.—Dr. Wm. Leiserson, Chairman, Board of Arbitration, Men's and Boys' Clothing Industry, New York City.

Accidents and Sickness.—Cecil G. Rice, Vice Chairman, Public Safety Committee, Allegheny County, Pittsburgh, Pa.

Hiring and Firing (Industrial Turnover).—Magnus W. Alexander, Managing Director, National Industrial Conference Board, New York City.

Fire Hazards.—(Speaker to be announced.)

Wednesday, October 26, 2 p. m.

House of Representatives' Hall

INDUSTRIAL EDUCATION (EDUCATION FOR A BETTER JOB.) Dr. Thomas E. Finnegan presiding.

The Elementary and Secondary Schools.—Dr. Wm. Davidson, Superintendent of Public Instruction, Pittsburgh, Pa.

The University or Technical Institution.—Dr. John M. Thomas, President, Pennsylvania State College, State College, Pa.

The Plant School.—Dr. Charles A. Prosser, Director, Dunwoody Institute, Minneapolis, Minn.

The Labor Union College.—Dr. John Philips, Second Vice-President, Pennsylvania Federation of Labor.

School for Training of Women Workers (The Bryn Mawr College Experiment).—Dean Hilda W. Smith.

Wednesday, October 26, 8 p. m.

House of Representatives' Hall

INDUSTRIAL WASTE. Honorable W. I. Schaffer presiding.

(a) Secretary Herbert Hoover.

(b) Bishop Francis McConnell.

FOURTH DAY

Thursday, October 27, 9 a. m.

House of Representatives' Hall

INDUSTRIAL PUBLICITY, E. J. Stackpole presiding.

The Daily Newspaper.—(Speaker to be announced.)

The Industrial Plant Magazine.—A. Ellis Frampton, Hammermill Paper Company, Erie, Pa.

(*Continued on page 212*)

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 475 RETRENCHMENT VERSUS SAFETY.—During the present period of business retrenchment, following closely on the heels of four years of big business, the average industrial concern is eliminating as far as possible all non-essentials.

In a great many concerns the pinch has been felt in the safety work of the plant, due partly to a desire to decrease expenses, but mostly to the fact that a great many so-called safety problems have been handled by the one in charge in a haphazard or happy-go-lucky manner.

Some concerns, not looking closely enough into the future, have gone the limit, and have discarded the safety organization entirely, leaving the safety of the plant and the employes in the hands of inexperienced persons, and in some cases, in the hands of an impersonal organization, either State or private, whichever method of insurance liability is carried. This is a big mistake, and the company adopting such a policy will suffer in the long run. There is no more excuse for such a policy than there is for canceling accident insurance. Any plant, whether operating with a dozen men or with a hundred, is as likely to have an accident to one of the dozen as to one of the hundred. Such an accident, if fatal, would be a much more expensive proposition to the organization with only a dozen employes than if there were a hundred or a thousand. The burden added to the manufacturing cost would be proportionately higher.

No concern whose accident problems, during the period of big business, were worthy the undivided attention of a safety organization or a safety engineer, can afford to entirely eliminate this work now.

To the safety engineer or supervisor, the opportunities of the present conditions are bigger than ever before. After he has convinced the management of the absolute necessity of "carrying on," he should prepare himself for a real and thorough inspection of the plant, with a view to accomplishing those essentials which have been neglected during the past years, due to the impossibility of making changes with the factory in full operation. One of the most important things to study, is the condition of the aisles, stairways and floors.

The aisle-ways of an industrial concern are the arteries through which the raw and finished products of the plant flow. They are the passageways for the employer, the employe and the visitor. Nothing is more important to the life of the plant, than a proper and sufficient system of aisles. Just as in the human body we have arteries and blood vessels, so in the industrial plant we have the main tracks or aisles and the tributary tracks or aisles. The main aisles, customarily leading from one exit to another, and to the elevators or conveyors, should be broad and free from all obstructions. They should be laid out in such a manner as to distinguish them from the rest of the floor either by painting the floor on each side of the aisle, or by some

other method which will distinguish them from the surrounding territory. Tributary aisles are those leading toward an opening and leading into a main aisle. While it is not necessary to make these aisles as wide as the main aisles, they should be as carefully laid out and kept free from obstructions. The width of both types of aisles should be governed by the type of traffic passing over them, with the thought always in mind, that during a time of panic, caused by a fire or some other unexpected happening, the aisles must accommodate *all* of the employes and enable them to reach a place of safety outside the building in which they work.

Aside from the consideration of fire-doors and stairway enclosures, which are of prime importance, there are a number of stair hazards that it is important to consider. One of the greatest risks is slipping while using the stairways; in consequence of this risk, the steps should be equipped with slip-proof treads, and kept in good condition. In addition to this, each stairway should have permanent handrails as follows: stairways open on both sides should have handrails 36 in. in height from the center of tread, on both sides. When the stairway is enclosed and less than 4 ft. in width, it should have a handrail on one side. When greater than 4 ft. in width, it should have handrails on both sides. If the stairway is over 8 ft. in width, it should have an additional handrail in the center.

The location of machinery, or lack of sufficient working space, creates a necessity for platforms and runways, which, unless properly constructed, are the cause of a great many injuries that would otherwise not occur. It is, of course, of first importance that such platforms, whether suspended from the ceiling or supported from below, should be sufficiently strong to support the greatest load to which they are subjected.

Of equal importance is the question of handrails and toe-boards. If the platform or runway is 4 ft. or more from the floor level, it should be equipped with a standard handrail, 3 ft. 6 in. in height, with a center rail. If it is 6 ft. or more in height it should also have a toe-board. If these platforms are used for temporary storage of surplus stock, as is often the case, a sufficient aisle-way should be plainly marked out, and kept absolutely free from all obstructions.

The floor of the factory is the foundation on which the life of the plant rests, and as the aisles are the arteries of the plant, the floors are the outer surface, which unites the whole into one common mass.

The requirements of a good floor, as outlined by the National Safety Council in their "Safe Practice" pamphlet on floors and flooring, are as follows:

1. It should be smooth and free from nails, bolts and other projections; also from holes and splinters.
2. It should be dry, of low heat conductivity, durable and easily cleaned.
3. It should be constructed strongly enough to bear safely at least 4 times the static load and 6 times the moving load which may be placed on it.
4. It should be as nearly noiseless as possible. A noisy floor may wear well, but the noise of feet, truck wheels, and machinery has an irritating effect on workmen.
5. It should not be slippery, nor be made of material which will wear slippery.

There are three general types of floors in use today: wood, cement and wood-block. Of these, wood floors are preferable to all others in places where they will withstand the wear and tear to which they are subjected. The preference for wood floors is on account of their warmth and quietness; they are also less likely to become slippery.

The cement or "dead floor" as it is called, is in use to a great extent, and while it has none of the qualities of a wood floor, except its life of service, it can be used, provided the employes are furnished with wooden platforms or other resilient material to stand on.

Wood-block floors are coming more and more into use as they have all the qualities of the ordinary wood floor, with the additional quality of longer life and less repairs.

Whatever type of floor is in use or is constructed, it should be kept free from protruding nails, splinters, holes, slipperiness, unevenness and loose material or boards. The greatest hazard of these is wet or slippery floors. One of the easiest and simplest of methods for over-

coming this, is to paint the floors around machinery and sprinkle a little sand on the wet paint. One concern has found that by applying a heavy coat of thick hot wood flake glue, and sprinkling with fine sand before cooling, slippery floors will be given a firm non-slipping surface.

In all cases, floors should be kept clean and free from loose materials or tools over which employes may trip. Racks and bins or boxes should be furnished wherever needed, for the storage of tools and material.

Such problems as the above, with others equally important, should be sufficient to keep the safety man on the job. The time for retrenchments is the time for revision. Improvement of the above will mean greater production for the future, and a materially reduced accident record.

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No. 476 FIELD HOSPITALS AND THEIR VALUE.—The first point of value I have found in the "Field Hospital" is to have the presence and location of it known by all. Another point that has come to my notice is that some of the workmen have the idea that they will be docked for the time spent in getting their injuries taken care of. Another thing that seems of a trivial nature but will be noticed if a study of the workmen is made, is that they hesitate about going into the hospital. I find that a Foreman's Personal Injury Report Slip is of great advantage in overcoming this, in that it seems to justify in their minds their going, because of the fact that the foreman sends them with this slip. Another point that I found of advantage was to post signs instructing the men to report their injuries to their foreman, and then to put it squarely up to the foreman to see that all injuries are reported to him.

NAIL-PUNCTURE EXPERIENCE

To my mind, a good deal of lost time and money is saved by these cards, as it tends to send the men to the Hospital where they are properly treated during the first five minutes after an accident, which are the best to prevent infection. This has been proved to me in a number of cases, especially in the handling of nail-puncture cases.

Of 57 nail-punctures (not cases) that occurred during a period of 6 months, 2 were to the head, 2 to the arms, 1 to the trunk, 22 to the feet, 3 to the legs and 27 to the hands.

Of 56 nail-puncture cases 4 resulted in lost time; of these, 3 were to the feet and 1 to the legs. In No. 1 of the lost time cases, the time loss was caused by the man's not reporting the accident until he had to lay off the next day because of the soreness of his foot. No. 2 was caused by the workman's following the advice of a fellow workman that evening after work. He removed the dressing that had been put on by the doctor and put a copper penny in a piece of salt pork and bound it on with the penny next to the wound. The foreman saw him sitting down the next morning and asked him what was the matter. After taking a look at the injured foot he had him brought into the hospital. The copper had got into the wound and aggravated the foot in such a way that the doctor had quite a fight to save the loss of it. When asked by the doctor why he had done this he was told that a fellow workman had done the same thing and his foot had got well. Case No. 3 was caused by stepping with the right foot on a board with a nail in it. The injured then tried to shake the board off, and as it did not come off he slammed down his left foot on the board on top of another nail and as he was angered he brought it down hard with the result that another nail was driven so far into his left foot that a fellow workman had to use a small working bar to get him free. Case No. 4 was an injury to a leg. The injured was toe-nailing a piece of studding on the floor and was holding it in place with his knee. He was talking to another workman and did not notice what he was doing and drove the nail through the studding, through his skin on his knee joint and into the floor. He also had to be liberated by a fellow workman with a wrecking bar.

As you will note, the lost time of these 4 cases was really caused by the entry of elements other than the nail-puncture

into the case. The other 52 cases were reported and dressed within a few minutes after the injury was received, and to my mind, this accounts for the reason of no lost time.

The figures for a period of 6 months show that of 1,322 *injuries received* (not the number of *accidents,* as some of the injured received 2 and 3 injuries at the same time), 3 per cent caused lost time and 10 per cent had to have redressing; 25 per cent of this 10 per cent had from one to three redressings, and 75 per cent four or more redressings; 14 per cent of the 1,322 injuries were in cases where there was more than one injury to a man per accident.

This averages 24.72 injuries per 1,000 men per year. The low percentage of lost time injuries and redressings is attributed to the fact that they were properly reported and dressed. I might add here that we were very successful in getting the workmen to report all injuries, no matter how slight, by putting it squarely up to the foreman, inasmuch as the foreman is made to realize that a "stitch in time saves nine."

The minor accidents for these 6 months show 860 lost hours. This is an estimate. The number of cases of different types and classes was watched and an average taken. Dressings at this time figured a cost of about 65c to 70c each, including the time required to come in from the field, as well as the dressing itself.

Combined safety and medical cost for this period averaged 97c per average full time payroll employe.

This cost figure includes all safety and medical department cost such as salaries, heat, light, stationery, equipment, upkeep of equipment, labor, material, etc. Figuring the cost of the safety and medical department against the gross payroll gives us an insurance rate of 62c per $100, which I think is a lower figure than an outside insurance company would offer.

In view of the above facts, the low percentage of redressings and of lost time injuries, I would say, is proof that a Field Hospital more than pays for itself. A little instance that I had called to mind goes to show of what value the walls of the waiting room of the hospital are. An injured man who had had a nail-puncture was sent into the office. He had to wait a few minutes in the waiting room and while there he read and looked at a number of bulletins that we had posted there on blood poison and improper advice offered by fellow workmen in the treatment of injuries. When he was interviewed by the Safety Engineer about his injury his first remark was "I did not know that a little scratch would cause so much trouble;" when asked by the Safety Engineer what he meant, he said "I have been reading those posters and bulletins that you have posted in the doctor's outside office and as there was nothing else for me to do or attract my attention I had a chance to fully realize their significance." This is only one of a number of similar cases where the men have spoken to me about the bulletins posted in that office.

Prizes for September Articles

First Prize. No. 474. Dr. W. N. Lipscomb, Scott County Health Department, City Hall, Georgetown, Ky.

Second Prize. No. 473. H. P. Heyne, Safety Inspector, United Alloy Steel Corporation, Canton, Ohio.

Honorable Mention. No. 472. Frank A. Wilkinson, Smith Insurance Service, Inc., Boston, Mass.

Mobilize Women for Safety

By Ida M. Tarbell

Proceedings of the Tenth Annual Congress of the National Safety Council (Women in Industry Section)

I AM here to suggest to the National Safety Council that it consider the possibility of rallying to the work of the Council a great body of women entirely outside of industry itself but responsive to appeals for public service, many of them organized in such a way as to focus power and influence quickly on tasks which appeal to their imaginations and to their hearts.

The work of the National Safety Council cannot be confined longer to the narrow limits of industry itself. The psychological effect of the present indifference to safety in our streets and on our highways cannot be ignored by industry. The wanton recklessness of the road dulls the attention and interest of the industrial worker, puts a premium on "taking a chance." Care becomes as out of fashion as a bicycle, recklessness as popular as an automobile. That is, public safety is the direct concern of industrial safety.

Not only will the thing for which the Council has been created, industrial safety, be advanced by work for public safety, but your man in industry who understands the principles of safety, will have an opportunity to serve the public in a way greatly to his advantage. That is, the worker at his machine, through safety organization, has attained a knowledge of the safety problem and the way to solve it which the ordinary citizen has not, and it would be a fine thing if the workers of this country could carry to the public what they have learned in the shop.

Granting all this, the woman power of the country must be enlisted. I do not know a finer job than to go after the women, particularly organized women.

I understand the feeling of certain women that a Woman in Industry section is what you may call a throw-back, that women should be taken into the Safety Council not as women at all, but as industrial workers, regardless of sex. We have a long way to go socially and industrially in this world before women will cease to be differentiated from men in all activities. Mother Nature will have to undo her work entirely before there will be no special problems connected with women wherever you meet them. It is the business of this section to handle whatever there is special in the problem, whether it is the best method of getting the obstinate girl at a dangerous machine to wear her cap, or having persuaded her to wear it, to keep her bangs tucked in; or whether it is the big and definite problem that I am suggesting, enlisting the women of the country, organized and unorganized, in a public safety campaign.

It is something of a job. And if it had not been for our experience with women's organizations in the war, I should not feel hopeful about it. That experience convinced me that the woman power of the country can be mobilized for permanent safety work, if this section will lead the way. Through the women's committee formed by the order of the Government at the beginning of the war, practically all of the great national women's organizations were rallied to the support of war enterprises. The organized woman power of every State in the Union was so pooled that you could throw it in this or that direction at a notice of in some cases not over 24 hours.

Suppose that this section was able to rally in each State to the work of industrial and public safety all of the great women's organized associations, to persuade them to take up this work as a permanent interest, what a power we would have behind the National Safety Council! Properly put to them, they would rise to it like a fish to a fly. It is their kind of thing.

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

CHURCHES

December 26, 1919. Shamokin, Pa. Trinity United Evangelical Church, Anthracite and Arch streets. One building partly destroyed. Walls, brick. Floors, wood. Roof, slate and tin. Cause, unknown. Fire started in basement. Discovered by neighbor across from church, who saw blaze in basement at about 7.30 p. m. Alarm, Gamewell system. Duration, about 6 hours. Stopped at second floor. Private fire apparatus, none. Persons in building, none. Injured, 2. Means of escape, no special provision. Value of building and contents about $60,000. Property loss, $26,000.

January 9, 1920. Chicago, Ill. Trinity Episcopal Church, 26th street and Michigan avenue. One building damaged. Walls, stone. Floors, wood. Roof, wood. Cause, overheated furnace. Fire started back of altar. Discovered by sexton at about 8.40. Alarm, telephone; also box alarm. Duration, 1 hour confined to building. Fire was retarded by construction of building. Private fire apparatus, none. Persons in building, none. Value of building and contents, $200,000. Property loss, $50,000.

January 11, 1920. Napoleon, O. St. Paul's Methodist Episcopal Church, Washington street. One 1-story building damaged. Walls, brick outside; wood hollow walls inside. Floors, wood. Roof, slate. Cause, small overheated furnace room. Fire started in furnace room. Discovered by passerby at 1.05 p. m. Alarm, telephone. Duration, 3½ hours. Stopped under roof. Private fire apparatus, none. Persons in building, none. Means of escape, doors. Value of building and contents, $10,000. Property loss, $7,000. Pipe organ was damaged by water.

January 12, 1920. Kansas City, Kans. London Heights Methodist Church, 15th and Garfield streets. One 2-story building damaged. Walls, wood. Floors, wood. Roof, wood. Cause thought to be an overheated furnace. Fire started near center of building. Discovered by citizen at about 12.05 a. m. Alarm given by running to fire station. Duration, 3 hours. Stopped at building in which it started. Fire was favored by old frame building. Private fire apparatus, none. Persons in building, none. Value of building and contents, $11,500. Property loss, $4,300.

January 26, 1920. Peoria, Ill. Grace Evangelical Church, 601 Stanley street. One 1-story building damaged. Walls, frame. Floors, wood. Roof, wood. Cause, defective flue. Fire started in basement. Discovered by neighbors at about 8 a. m. Alarm, Gamewell system. Duration, 1 hour, 45 minutes. Stopped at attic. Fire was favored by construction of building. Firemen handicapped by cold weather. Private fire apparatus, none. Value of building and contents, $6,000. Property loss, $400.

February 15, 1920. Chicago, Ill. Swedish Lutheran Church, 10135 Avenue L. One 1-story-and-balcony building partly destroyed. Walls, wood, lath and plaster. Floors, wood. Roof, wooden shingles covered with tar paper. Cause, overheated boiler. Fire started in basement ceiling over boiler. Discovered by members of Sunday School class in session, at 9.01 a. m. Alarm, still by public telephone relayed by F. A. O. Duration, 1 hour, 30 minutes. Confined to building of origin. Fire was favored by frame construction. Private fire apparatus, none. Persons in building, 30. Killed, none. Injured, none. Means of escape, front and rear doors. Value of building and contents, $5,500. Property loss, $3,700.

February 16, 1920. Indianapolis, Ind. Tuxedo Baptist Church, 229 Garfield avenue. One 2-story building damaged. Walls, brick Floors, wood. Roof, shingles. Cause, overheated furnace. Fire started in basement boiler-room. Discovered by passerby at 6.35 p. m. Alarm, telephone. Duration, 1 hour, 51 minutes. Stopped at first floor. Fire was favored by openings which led to the seat of the fire. Private fire apparatus, none. Persons in building, none. Means of escape, main exits. Value of building and contents, $21,800. Property loss, $5,200.

February 21, 1920. Mount Pleasant, Mich. Unitarian Church, used as Red Cross Hospital, corner Illinois and Normal streets. One 1-story-and-attic building destroyed. Walls, stone. Floors, wood. Roof, shingle. Cause, overheated furnace. Fire started in basement. Discovered by flames coming through floor at about 6 a. m. Alarm, telephone. Duration, 3

hours. Stopped at roof. Fire was favored by construction of building. Firemen handicapped by frozen hydrant. Private fire apparatus, truck. Persons in building, 7. Killed, none. Injured, none. Means of escape, windows and doors. Value of building and contents, $4,000. Property loss not reported to SAFETY ENGINEERING.

February 24, 1920. Pickford, Mich. Catholic Church and Draper Garage, Main street. One 1- and one 2-story buildings destroyed. Walls, garage, brick, iron and wood; church, wood. Floors, cement and wood. Roofs, garage, iron; church, wood. Cause, explosion while cranking a Ford car to test it. Fire started in garage. Discovered at about 10.30 a. m. Alarm, none. Duration, about 2 hours. Stopped at streets on 3 sides. Fire was retarded by construction of building and by snow outside. Firemen handicapped because nothing could be done, as fire was too quick and hot to fight. Private fire apparatus, water pails and shovels, but none were needed or used. Persons in building, 1. Killed, none. Injured, none. Means of escape, in garage, stairs. Value of buildings and contents, about $6,000. Property loss, about $6,000.

February 29, 1920. Coldwater, Kans. Methodist Episcopal Church. One 1-story building damaged. Walls, wood, lap-siding. Floors, wood, 4-inch. Roof, shingle. Cause, defective flue. Fire started under floor at 2 x 8 set against brick flue. Discovered by smoke coming out of basement at about 2 p. m. Alarm, telephone and whistle. Duration, about 1 hour. Burned out floor only. Firemen handicapped by lack of masks. Private fire apparatus, none. Persons in building, none. Means of escape, 3 doors. Value of building and contents, about $7,000. Property loss, about $3,500.

March 3, 1920. Indianapolis, Ind. St. John's African Methodist Church, 17th street and Columbia avenue. One 1-story building totally destroyed. Walls, wood. Floors, wood. Roof, shingle. Cause, defective wiring. Discovered by passerby at 8.50 a. m. Alarm, telephone. Duration 1 hour, 41 minutes. Stopped at total loss. Fire was favored by old wooden construction. Private fire apparatus, none. Persons in building, none. Means of escape, main doors and windows. Value of building and contents, $7,000. Property loss, $7,000.

March 3, 1920. Monroe, La. Negro Baptist Church and house of Joe Mashala, North 8th near Breard street. Three 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wooden shingles. Cause, overheated gas stove. Fire started about center of church. Discovered by outsider at about 8.10 p. m. Alarm, telephone. Duration, 45 minutes. Stopped at third house. Fire was favored by wooden shingles. Firemen handicapped by 6" water line with 30-lb. pressure. Private fire apparatus, none. Persons in building, none. Value of building and contents, $4,000. Property loss, $4,000.

March 9, 1920. Meridian, Okla. Christian Church, corner Allen and Fourth streets. Fire in one 1-story building. Walls, stone. Floors, wood. Roof, shingles. Cause, gasoline thrown in stove by boy. Fire started at stove. Discovered by children calling for help at once. No adults present. Duration brief. Stopped at place of origin. Private fire apparatus, none. Persons in building, about 10. Injured, 3. Value of building and contents, not reported. Property loss, none; personal injuries were the only damage.

March 20, 1920. Cumberland, Wis. St. Anthony's Catholic Church. One building destroyed. Walls, wood. Floors, wood. Roof, shingle. Cause, unknown. Discovered by passerby at about 1.45 p. m. Alarm, telephone. Stopped at church. There were no other buildings near. Fire was favored by wooden construction. Private fire apparatus, none. Persons in building, none. No further details.

March 21, 1920. Liberty, Mo. Second Baptist Church, Leonard and Franklin streets. One 1-story building destroyed. Walls, brick. Floors, wood. Roof, shingles. Cause, flue burning out. Fire started at roof. Discovered by passersby at about 10.30. Alarm delayed. Duration, about 2½ hours. Stopped at total loss. Firemen handicapped by high wind. Private fire apparatus, none. Persons in building, about 300. Killed, none. Injured, none. Means of escape, plenty of doors. Value of building and contents, about $30,000. Insurance, $13,000.

April 5, 1920. Montreal, Que. The Chevra Kadisha Synagogue, 289-305 St. Urbain street. One 2-story building destroyed. Walls, brick and stone. Floors, wood. Roof, tar. Cause, unknown. Fire started in front part of building. Discovered at 11.19 a. m. Alarm, street box. Duration, 2½ hours. Stopped at same building. Firemen handicapped by smoke explosion. Private fire apparatus, none. Persons in building and value of building and contents, not reported. Property loss, $45,000.

May 8, 1920. Milford, Ind. Methodist Church. One 1-story building destroyed. Walls, brick veneer. Ceilings, steel. Roof, shingle. Cause, defective 10-year-old wiring (supposed by Chief). Fire broke out roof. Discovered at about 3.30 p. m. Stopped at complete loss Fire was favored by age of building, built about 1865 and remodeled in 1899. Firemen handicapped by entire roof on fire before discovery. Chief thinks it had smoldered 24 hours. There were 19 incipient blazes in 1 hour in adjoining buildings. Persons in building, none. Means of escape, 3 exits. Value of building and contents, $23,000. Property loss, $23,000.

June 13, 1920. Honey Creek, Wis. First Baptist Church and Community Hall. Three 1-story buildings destroyed. Walls, brick veneered. Floors, wood. Roofs, wood shingles. Cause, defective oil stove. Fire started in basement of Hall. Discovered by outsiders at about 1.30 p. m. Duration, about 2 hours. Stopped at church when buildings were consumed. Fire was favored by construction of

buildings. There was no fire department in the town. Private fire apparatus, hand apparatus and bucket line. Persons in building, none. Means of escape, regular exits. Value of building and contents, $40,000. Property loss, $40,000.

June 23, 1920. Hartford, Conn. South Congregational Church, 307 Main street. One building damaged. Walls, stone and brick. Floors, wood. Roof, wood and tin. Cause, probably painter using blow-torch burning off paint. Fire started at wood cornice. Discovered by workman at about 1.40 p.m. Alarm, prompt. Duration, about 1 hour. Stopped at attic, where it started. Private fire apparatus, none. Injured, 2 (firemen, overcome by smoke). Value of building and contents, $90,000. Insurance loss, $35,844.

July 19, 1920. Depere, Wis. Christ Episcopal Church, Oneida Reservation (in the country). One building damaged. Walls, stone. Floors, wood. Cause, lightning. Fire started in roof. Discovered at night. Duration about 2 hours. Stopped inside walls. Fire was retarded by stone walls. Firemen handicapped by lack of water. There was no fire department. Private fire apparatus, none. Persons in building, none. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

September 19, 1920. Denton, Tex. Central Presbyterian Church, 303 Bolivar street. One 1-story building damaged. Walls, frame. Floors, wood. Roof, shingle. Cause, unknown. Fire started in house used for church purposes. Discovered by neighbor across street at about 12.30 p.m. Alarm, private telephone. Firemen handicapped by bursting hose. No further information reported to SAFETY ENGINEERING.

November 22, 1920. Philadelphia, Pa. Beacon Presbyterian Church Hall, 2377 E. Letterly street. One 2-story building damaged. Walls, brick. Floors, wood. Roof, tin. Cause, unknown. Fire started on second floor. Discovered by workmen at about 11.25 a.m. Alarm, telegraph. Duration, 3 hours. Confined to floor of origin. Further details not reported to SAFETY ENGINEERING.

November 24, 1920. Brooklyn, N. Y. Plymouth Church, 62 Cranberry street. One 2-story building damaged. Walls, brick. Cause, not ascertained. Fire started in boiler room. Discovered by janitor at about 1.10 a.m. Alarm, telegraph. Duration, under control in 50 minutes. Stopped at loft. Firemen handicapped by delay in discovering fire. Further particulars not reported to SAFETY ENGINEERING.

December 24, 1920. Hanford, Wash. Christian Church. Basement rented as temporary living quarters. One 1-story building damaged. Walls, concrete blocks. Floors; wood. Roof, shingle. Cause, overheated stovepipe too close to basement ceiling. Fire started in basement ceiling over stove where tenant was manufacturing whisky. Discovered by school children who saw smoke coming from basement at about 2.30 p.m. Alarm, still. Duration, 30 minutes. Confined to basement ceiling. Fire was favored by construction of building. Private fire apparatus, hose cart and 550 feet hose. Persons in building, none. Means of escape, doors at both ends of building. Value of building and contents, $6,000. Property loss, $750.

December 26, 1920. Butler, Pa. St. Michael's Roman Catholic Church, Spring street. Two 2-story buildings damaged. Walls; frame. Floors, wood. Roofs, shingles and slate. Caused by boys upsetting candle. Fire started in altar and went into attic which was of flimsy construction. Discovered by man who saw boys running away at about 12.20 noon. Alarm, telephone. Duration, 1 hour. Stopped at attic. Fire was started by wooden construction. Private fire apparatus, none. Persons in building, 2 (in parsonage). Killed, none. Injured, 1 (fireman). Value of building and contents, $20,000. Property loss, $10,000. Library containing valuable papers was ruined.

January 16, 1921. Brighton, Mass. Brighton Congregational Church, 404 Washington street. One 1-story building partly destroyed. Walls, wood. Floors, wood. Roof, slate. Cause, unknown. Fire probably started in the sexton's locker, in basement. Discovered by outsider at 9.01 p.m. Alarm, box. Duration, 5 hours. Stopped at roof. Fire was favored by wooden construction of building with no firestops. It mushroomed on floor timbers, went up space along organ and airpipe ventilator to roof, passing between roof and ceiling until extinguished. Private fire apparatus, pails of water. Persons in building, none. Means of escape, doors on 3 sides. Value of building and contents, $60,000. Property loss, approximately $40,000. Papers were protected.

January 30, 1921. St. Louis, Mo. Grace Holy Cross Church, Goodfellow and Barten streets. One 1-story building damaged. Walls, wood. Floors, wood. Roof, shingle. Cause, overheated furnace. Fire started in basement. Discovered by citizen at 6.03 p.m. Alarm, street box. Duration, 3 hours. Confined to building. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, none. Means of escape, none. Value of building and contents, $14,290. Property loss, $9,540.

February 2, 1921. Edmonton, Alta. Roman Catholic Church and Parish Hall, St. Albert, 11 miles out. One 1-story building destroyed. Walls, frame. Floors, wood. Roof, shingle. Cause, overheated stove. Fire started on ground floor. Discovered by convent sister at about 6 p.m. Alarm, telephone to Edmonton. Duration, 4 to 5 hours. Stopped when building had burned down. Fire was favored by construction of building. Firemen handicapped by lack of water. Private fire apparatus, none. St. Albert had 2 hand-drawn chemicals, and Edmonton sent chemical-and-hose motor combination. Persons in building, none. Value of building and contents, $11,000. Property loss, $11,000. Valuable paintings were lost.

February 26, 1921. Yarmouth, N. S. Providence Methodist Church, Main street. One 2-story building destroyed. Walls, lath and plaster. Floors, wood. Roof, wooden shingles. Cause, unknown. Fire started in small kindling-wood storeroom under belfry. Discovered by passerby at about 12.30 a. m. Alarm, Gamewell system. Duration, 5 hours. Stopped at front part of building. Fire was favored by getting into belfry and attic; it swept through the main building. Private fire apparatus, none. Persons in building, none. Value of building and contents, $35,000. Property loss, $35,000. Papers all lost.

April 3, 1921. Roanoke, Va. Greene Memorial M. E. Church, S. E. corner Church avenue and Second street. One 2-story building damaged. Walls, stone. Floors, wood. Roof, metal. Cause, spontaneous combustion. Fire started in air tower. Discovered by next door neighbor at 4.05 a. m. Alarm, box. Duration, 1 hour, 30 minutes. Stopped at roof. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, none. Value of building and contents, $135,000. Property loss, $16,634.

April 6, 1921. Seattle, Wash. Green Lake Baptist Church, Fifth avenue, N. E., and East 72d street. One large 1-story building destroyed. Walls, light frame, the flimsiest possible. Floors, frame. Roof, shingle. Cause, spark on shingle roof, possibly from fire in furnace. Fire started on roof. Discovered by passerby at about 11.05 p. m. Alarm, box. Duration, 1 hour. Stopped when building was burned. Fire was favored by construction of building. Firemen handicapped by distance from fire. Private fire apparatus, none, and no chance to use any. Persons in building, none. Means of escape, ordinary exits. Value of building and contents, $10,000. Property loss, $8,500.

April 6, 1921. Washington, D. C. St. Paul's Parish Church, Rock Creek Cemetery. One 1-story building destroyed. Walls, brick. Floors, wood. Roof, slate. Cause, unknown. Discovered by light from flames at 4.10 a. m. Alarm, box. Duration, 3 hours after alarm. Stopped when building was destroyed, leaving walls and tower standing. Fire was favored by construction of building. Firemen handicapped by necessity of lining in to get water. Private fire apparatus, none. Persons in building, none. Means of escape, doors. Value of building and contents, unknown. Property loss, $37,000. Part of papers were saved in safe.

April 13, 1921. Murdo, S. D. Catholic Church and Parish House. One 1-story building destroyed and another damaged. Walls, frame and plaster. Floors, hardwood. Roof, shingle. Cause, unknown. Fire started inside. Discovered by railroad employe working in yards at about 4.30 a. m. Alarm, verbal. Duration, 1 hour, perhaps. Stopped at total loss. Fire was favored by wooden construction. Firemen handicapped because building was completely enveloped in flames when fire was discovered. Private apparatus, buckets, chemicals, etc. Persons in building, none. Value of building and contents, $7,500. Property loss, $7,500.

April 22, 1921. Raleigh, N. C. Pullen Memorial Church, S. W. corner South and Fayetteville streets. One 1-story-and-gallery building destroyed. Walls, frame. Floors, wood. Roof, shingles. Cause, unknown. Fire started in rear, back of organ. Discovered by passerby at about 10.40 p.m. Alarm, telegraph. Duration, 2 hours. Private fire apparatus, none. Persons in building, none. Value of building and contents, about $25,000. Property loss, about $25,000.

June 10, 1921. St. Margaret's, Prince Edward Island, Canada. Catholic Church and home of J. Feehan. Nine 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, forest fires. Fire started on roofs. Discovered at about 4 p.m. No fire department. Duration, 12 hours. Stopped when everything was burned. Fire was favored by construction of buildings. Private fire apparatus, ladders, ropes and water buckets. Persons in building, 5. Killed, none. Injured, none. Value of buildings and contents, about $30,000. Property loss, about $20,000. Papers were mostly saved.

THEATERS AND AMUSEMENT PLACES

September 25, 1920. Butte, Mont. People's Theater, 39 E. Park street. Theater; café, pool hall, jewelry store and boot black stand were also in building. One 3-story building damaged. Walls, brick. Floors, wood. Roofs, tar. Cause, unknown; fire in all parts when department arrived. Fire started in theater. Discovered by manager of pool hall at about 2.10 a. m. Alarm, telephone. Duration, 6 hours. Stopped in theater. Fire was confined to theater; only water damage in pool hall and jewelry store. Private fire apparatus, hand chemicals. Persons in building, number not reported. Killed, none. Injured, none. Means of escape, fire escapes. Value of building and contents, $121,200. Property loss, $35,691.

September 27, 1920. Butte, Mont. Broadway Theater, S. W. corner of Broadway and Montana streets. Theater and lodging house. One-story building damaged. Walls, brick. Floors, wood. Roofs, tin. Cause, supposed cigarette thrown in curtain, or acid used on stage. Fire started on the stage. Discovered by stage hand at about 4.50 p. m. Alarm, telephone. Duration, 45 minutes. Stopped at stage. Fire was retarded by construction of building. Private fire apparatus (available but not used), hand chemical and standpipe. Persons in building, number not reported. Killed, none. Injured, none. Means of escape, fire escape and fire exit doors. Value of building and contents, $150,000. Property loss, $3.278.

Damage was slight and performance was given same evening after fire.

October 9, 1920. Tulsa, Okla. Grand Theatre building, 117 E. 2d street. Opera house, stores and room. One 3-story building destroyed. Walls, brick. Floors, wood Roofs, gravel. Cause, electric wiring. Fire started under stage in theater. Discovered by night watchmen at about 1.03 a. m. Alarm,

night watchman passed up 3 fire alarm boxes to notify fire department. Duration, 3 hours. Stopped at fire wall. Fire was retarded by construction of building. Firemen handicapped by overhead wires. Private fire apparatus, six 3-gallon soda and acid extinquishers. Persons in building, 6. Killed, none. Injured, none. Means of escape, 75-foot aerial truck. Value of building and contents, $58,000. Property loss, $55,000. Papers were protected.

January 16, 1921. Albia, Iowa. Albia Opera House, King's Theatre building. Moving picture show. One building gutted; 3 others damaged by falling chimney and heat. Walls, brick. Cause, unknown. Fire started in afternoon. Discovered by employe. Alarm, telephone. Duration, 5 hours. Fire was favored by construction of buildings. Private fire apparatus, 2 Babcocks. Persons in building, 1. Killed, none. Injured, none. Means of escape, 4 side exits. Value of building and contents, $77,945. Property loss not reported.

January 20, 1921. Louisville, Ky. Hippodrome Theatre, S. E. corner Market and 2d streets. Moving picture show. One building damaged. Walls, brick. Cause, film flash in booth. Discovered by operator. Alarm, telephone. Duration, 10 minutes. Stopped at booth of origin. Fire was retarded by metal-lined operators' booth. Private fire apparatus, two 2½-gallon extinguishers. Persons in building, about 50. Killed, none. Injured, none. No panic. Means of escape, exits on ground floor; no balconies. Value of building and contents, $15,000. Property loss, about $50.

February 2, 1921. Montague, Mich. Clarence Smith's motion picture theater, on Berry street, in the center of the block. One 2-story building destroyed. Walls, wood and sheet iron. Floors, maple. Roof, tar paper. Cause, unknown. Fire discovered in center of building, first floor. Discovered by woman across the road, at about 3 a. m. Alarm, fire bell. Duration, 5 hours. Stopped at same building. Fire was favored by construction of building. Firemen handicapped by lack of steam enough to start engine. Private fire apparatus, none. Persons in building, none. Means of escape, none. Value of building and contents, $1,400. Property loss, $1,200.

February 4, 1921. Michigan City, Ind. Garden Theater Building, 516 Franklin street. Show house, with offices and stores. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roof, wood. Cause, film exploded. Fire started in picture operating room. Discovered by operator at about 1.04 p. m. Alarm, telephone. Duration, 4 hours. Stopped at fire wall and asbestos curtain. Fire was favored by construction of building. Firemen handicapped by shortage of ladders and delay in turning in alarm. Private fire apparatus, 2 chemical cans and 2 connections of small hose. Persons in building, 200. Killed, none. Injured, 3. Means of escape, exits and fire escapes. Value of building and contents, $120,700. Property loss, $51,004. Papers all removed.

February 9, 1921. Detroit, Mich. Pier dance hall and coliseum in amusement park. One 1-story building destroyed; several adjacent buildings damaged. Walls, mill. Floors, wood. Roof, iron. Cause, careless use of matches. Fire started in locker room under dance hall. Discovered by employes at about 12.53 a. m. Alarm, street box, after delay. Duration, 8½ hours. Stopped at building of origin. Fire was favored by flimsily built mill construction, and closely packed concessions. Firemen handicapped by distance from street and late alarm. Private fire apparatus, small hand extinguishers. Persons in building, 8. Killed, none. Injured, 3. Means of escape, exit from dance hall, tunnel passage 150 feet long. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

This building was of mill construction, flimsily built, in a large amusement park; the concessions were closely packed together. The dance hall was entered through a tunnel passageway, 150 to 200 feet long, which led onto ballroom floor. Under this floor the fire started, in lockers used by employes. When the employes discovered it they attempted to extinguish it with hand extinguishers, without calling the department, and so let it get a big start before the alarm was turned in.

To extinguish the fire, the department worked 12 motor driven pumpers, 3 horse drawn steamers, 5 motor ladder trucks, 2 fire boats and 2 fire boat tenders, with 1 squad company, and stretched 2,900 feet of 3-inch hose and 16,300 feet of 2½-inch hose. Used 17 ladders, 367 feet.

February 14, 1921. Nogales, Ariz. Wise Building on Grand avenue. Theater One 1- and 2-story building partly destroyed. Walls, brick and concrete. Floors, cement. Roof, composition Cause, cigarette or set on fire. Fire started in dressing rooms. Discovered by janitor at once. Duration, 2½ hours. Stopped at same building by the fire department. Fire was favored by construction of building and by stage scenery and curtain. Volunteer firemen handicapped by being unable to get between metal ceiling and composition roof, which was also unsafe. Private fire apparatus, none. Persons in building, 2. Killed, none. Injured, none. Means of escape, good. Value of building and contents, $30,000. Property loss, $20,000.

April 26, 1921. Davenport, Iowa. Business section, 415 Ferry street. Burtis' Opera House. One 2½-story building destroyed. Walls, brick. Cause, incendiary. Fire started on stage (rear). Discovered by outsiders at about 1.10 a. m. Alarm, fire alarm boxes. Duration, 4½ hours. Stopped at same building. Fire was favored by building construction. Firemen handicapped by some companies working at other fire. Private fire apparatus, hose and alarm box on stage. Persons in building, none. Means of escape, exits and fire escapes. Value of building and contents, $61,000. Property loss, $56,000.

Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

SAFETY IN ELEVATOR CONTROL

The fact that electrically driven elevators can be automatically safeguarded against accidents to life and limb accounts in large measure for the marked increase in this type of elevator installation. Most elevator accidents are due to carelessness on the part of either the elevator operator or the passengers, or sometimes both. In the case of electric elevators, it is easily possible to prevent accidents which might occur due to the carelessness of either the operator or the passenger. These safety devices have practically revolutionized elevator operation and have made vertical travel safer in many ways than travel on level ground.

Some of the safety devices used on present day elevators include limit switches to prevent car overtravel, relays to safeguard the motor, slack cable switches, door safety switches, etc. Among the several types of limit switches, two will be described. The first is a rotating cam machine limit device of the type used with a winding drum type elevator. It is connected to the traveling nut mechanism of the winding drum and automatically stops the car when it reaches either the top or bottom landing. In the type manufactured by the Cutler-Hammer Manufacturing Co., an illustration of which is shown herewith, contacts are provided for automatically slowing down the car as well as stopping it at the terminal landings. Of course the elevator controller must be arranged for this slow-down feature.

C-H Rotating Cam Machine Limit Device

The second type of limit switch which finds very extensive use is the hoistway limit switch. At least two of these switches are necessary for every installation. They are usually mounted in the hoistway in such a manner that one is operated by the elevator car and the other by the counterweight. This arrangement locates both switches at one end of the hoistway and shortens and simplifies the wiring. This type of limit switch *must* be used on elevators of the traction type, and it *may* be used in place of machine type limit switches on drum type elevators. The limit switch shown in the illustration is of the double pole enclosed type—a type that is to be recommended for passenger service particularly, because it opens both sides of the control circuit and insures the stopping of the elevator motor even though one of the control lines may become grounded. The switch is operated by a long inclined cam on the elevator car or the counterweight. These switches should be so mounted that the operating wheel extends downward so that any loose material which drops down the hoistway will not be caught between the roller and the wall and prevent operation or cause the destruction of the switch when the cam engages with the wheel.

A phase failure and phase reversal relay is used in connection with alternating current polyphase motors. It prevents the motor from being started if the phases are accidentally reversed. In other words, it prevents the elevator car from being started in a direction opposite to that which the operator expects it to move. Such a relay will also stop the motor in case of phase failure due to the opening of the supply line at any point. This is a safeguard against the motor's overheating when running single phase. The Cutler-Hammer phase failure and phase reversal relay is so constructed that it will not operate until the load increases to a harmful point or until an attempt is made to start the motor after it has been stopped. It works on the principle of an induction disc wattmeter. A mercury switch opens and closes the control circuit and is so arranged that it makes the relay very sensitive to phase unbalancing.

The slack cable switch of the type most frequently used is a switch of the double pole type which is provided with a latch so that when tripped the contacts remain open until reset by hand. It is purposely made without an automatic reset in order that the electrician

will be obliged to go to the machine room to close it. This insures an inspection of the machine and the correction of the trouble before the elevator car can be started. The action of the switch is as follows:

Should the elevator car cable become slack either because the car or the counterweight is caught in the guides, the switch trips with a quick snap and opens both sides of the control circuit. This prevents considerable cable being unwound before the operator has had an opportunity to shut off the power. Without some form of automatic slack cable switch, the car after having unwound considerable cable might release itself, drop, and break the cable. With a slack cable switch such an accident is impossible.

Door safety switches probably eliminate more accidents than any other single elevator safety device. They prevent the starting of the elevator car before the doors have been closed. They interpose a break in the control circuit of the main controller when the door is open. When the door has been closed, the safety switch closes the break in the control circuit and the car can be moved. Type A is generally used where space limitations compel the installation of a small switch. It is operated by a push button which engages the end of a sliding door. Type B is operated by a lever and roller which engages with a cam on the sliding door. Type B is very rugged and is to be preferred wherever the space limitations will allow.

ELEVATOR SAFETY DEVICE

Schlesinger's safety interlock system was devised for protection at the elevator door. The device comprises a switch box fixed to the door frame and a manually operated shiftable lock bar mounted on the door, both elements including switch members as shown in Fig. 1; i.e., the locking bar carries a switch member, which co-operates with contact plates, the latter being arranged within the switch box and inserted into a control circuit.

The apparatus is manufactured and marketed by the Utility Safety Appliance Corporation, 325 Church street, New York, N. Y.

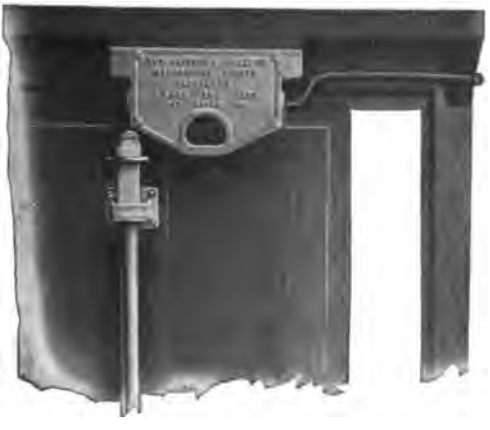


FIG. 1.

The switch member is properly insulated from the locking bar and casing. The contact plates, on the other hand, are mounted upon holders which are of insulating material, as shown in Fig. 2. The casing is so constructed that it may be applied to sliding doors, opening to either left or right, and also to hinged swinging doors.

The locking bar is guided in its movement by guides (Fig. 1) and is provided with a handle of non-corroding material, within which handle is disposed a spring.

FIG. 2.

The control circuit is completed only after the door has been securely locked (Fig. 3). More particularly, the locking bar must have been fully inserted into the casing, it first preventing the door from opening and then completing the control circuit. In opening the door, the circuit is thus positively interrupted before the door is unlocked.

An arc-interrupter of non-combustible insulating material is disposed so as to slide within the casing, it being held by the locking bar in its elevated position, but sliding by gravity downwards between the contact plates when the locking bar is withdrawn from the casing. In this manner any possible arc that may be formed between the contact plates is extinguished. The arc-interrupter serves at the same time as an indicating device, as shown in Fig. 1, the word "Open" appearing through an opening in the cover plate of the casing when the locking bolt is withdrawn. A third function of the arc-interrupter is to serve as a barrier between the contact plates when the door is in its open position.

From the foregoing, it appears that the moving parts of the interlock are reduced to a possible minimum; consequently the possibility of disarrangement or of getting out of order is very slight (Fig. 2).

If the spring fails to act, i.e., if broken, the door will not be closed nor will the control circuit be completed. Therefore, a broken spring does not create a hazard. This feature is due to the fact that the spring is disposed in such a position and co-acts with the switch in such a manner that the switch is not

brought into closing position until after the door is securely locked.

The opening in the casing cover is closed by a mica window (Fig. 1), through which convenient inspection may be had, the operator being able to ascertain by means of the indicating feature above mentioned as to whether or not the door is open, and also able to observe at a glance whether the switch box has been tampered with.

Actual operation tests reveal the fact that when the switch is very slowly removed from the contact plates, a slight arcing may occur between the switch and contact plates, but in all cases the arc is extinguished before the locking bar is withdrawn without the aid of the arc-interrupter. Tests have also shown that, if the contact plates are purposely pitted and covered with soot, which would be the result of arcing, the locking bar brightens the contact plates after a few normal operations, and careful observation failed then to show any ill effects on the parts of the mechanism.

Flashover between contact plates and casing occurs at 5,900 volts. Flashover between binding post and screw-holding contact plate holders occurs at 39,100 volts.

The contact plate holders are made of lava, and are spaced from the casing by an insulator of Vulcabeston, four metal screws keeping the contact holders in place.

Contact plates are an arc of phosphor bronze, capable of withstanding hard and long usage.

The bottom of the casing is slanting, so that any copper dust that may be formed by the operation of the lock cannot accumulate therein, as the dust leaves the casing through the opening, through which the lock is inserted.

The interlocks and also the gate switches are in an electric circuit which includes two 110 volt relays and a 220 volt centering relay. This circuit is completed by the closing of any door in the shaft, which in turn, completes the main line circuit by main line magnets. From this it appears that, whenever any one door in the series is open, the main line circuit is interrupted, i.e., no current flows to the car switch whenever a door is opened. The elevator controller is so inserted into the circuit that no current will flow to it whenever any one of the doors is open.

The two 110 volt relays, the 220 volt centering relay, and the main line magnets are inclosed in a securely locked cabinet. In this cabinet are also enclosed switches, which are so located that the main line and auxiliary circuits are opened before access can be had to the magnets. The 110 volt protecting relays are so located in the circuit that, in case a ground occurs in the interlock circuit, no blowout will result but one of these relays will hold its switch element in its closing position, thereby not interfering with the operation of the elevator.

The purpose of the non-interference cabinet is three-fold. The first purpose is to prevent operation of the elevators by manually operating the elevator switches, while a door is open. The second purpose is, when the glass panels are removed from the front of the board to break the entire electric circuit, thereby protecting the engineer from working with a live circuit. The third purpose is to signal to the engineer in the motor room that somewhere in the line there is a ground. This the engineer will be able to observe, through the glass cover, by noting that one or the other 110 volt protecting relays continuously keeps its switch element in its closing position.

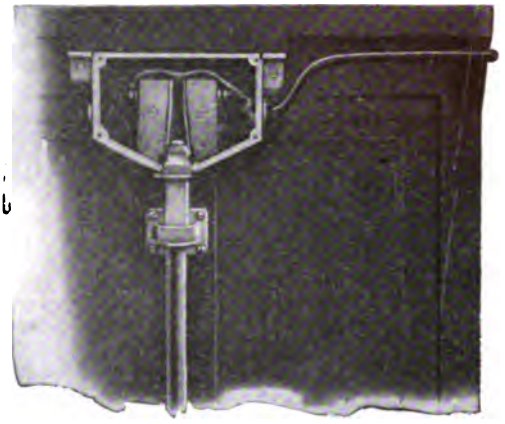


FIG. 3.

In each elevator is situated an emergency release, which is inserted in the control circuit, allowing the elevator to be operated in case of emergency. The emergency release includes a switch, which is manually operated and completes the circuit as long as the operator holds the same in closed position. The emergency release switch is in a glass covered casing and access can be had to it only after breaking the glass cover. Means are provided on the casing whereby the glass may be broken without the aid of any tools. The cover can easily be mounted on the casing after the broken glass has been replaced, it being held in position without the aid of screws or other fastenings, the attaching means being made part of the casing and the cover.

NEW BRICK WALL*

In view of the enormous annual losses from fire and decay which result from America's habit of building largely of non-permanent construction, the development of the Ideal Wall concerns everyone interested in the large subject of safety, and particularly the large phase of the subject concerning safety in building construction.

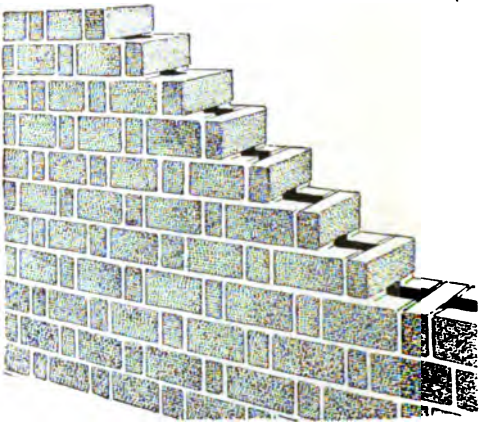
The wall of brick has saved many a life and many a thousand dollars' worth of property from damage and destruction, a fact which is not surprising when the nature of the material is considered. Made from mother earth itself, heated to a glowing red in a fiery kiln, brick

is the most indestructible material made by man. Little wonder that a brick chimney may often be seen standing alone and uninjured in the ashes of a burned home, and little wonder that brick is favored by insurance underwriters by the lowest of rates.

To place this material at the service of the builder of the humblest cottage at no greater outlay than for other excellent but non-permanent construction is to benefit the entire building public. This is actually accomplished by the development of the Ideal Wall, which by its design eliminates one-third of the material needed to build a wall of traditional brick construction; and eliminates also the furring required for the inside of a wall of any other masonry construction, thus lowering the cost of the brick wall below that of any other type.

Briefly, in the Ideal Wall the bricks are laid on edge instead of on their usual flat bed, leaving a ventilated space in the center of the wall. Nine bricks for every square foot are all that are needed to build a wall 8" thick; the brick used are all of standard size, no special sizes being necessary. By placing the brick thus, there can be no continuous mortar joint from front to back of the wall, and the mortar joint has proved in practice to be the only route through which ordinary exterior dampness can penetrate a brick wall of ordinary construction above grade. The small amount of rain or other moisture which comes in contact with the end of a well burned header cannot be conducted the full length of the brick by capillary attraction; moreover the slight circulation of air in the cavity tends to dry out any suspicion of moisture in the portion of the header within the hollow space. Thus the inside of the wall remains dry without the use of furring strips even in rainy weather, a fact amply proved in the many homes already built with Ideal Walls.

Experience has shown that the labor cost on the Ideal Wall is low; in many places where this construction is in general use, labor contracts have been taken to lay Ideal Walls at $12 per thousand brick, this including bricklayers' and laborers' time and profit on the contract. Even without experience a bricklayer will lay more square feet of wall per day than with solid construction, and with a little experience will lay almost as many brick.



The appearance of this wall with any brick is strikingly distinctive and attractive, and it is found that the rough wire cut or struck surface of the stretchers forms a charming combination with the smooth end of the headers, where such brick are used.

For those who prefer the ordinary appearance of brickwork, however, the Ideal Rolok-Bak Wall has been developed. In this wall the outside course is laid flat, the backing only being on edge.

*The Common Brick Manufacturers' Association, Schofield Building, Cleveland, O., has officially approved the design of this wall, and is assisting in the effort to make it popular. This organization publishes and sends to inquirers several pieces of literature describing the wall.

Industrial Relations Conference

(*Continued from page* 198)

The Technical Journal.— Wm. W. Macon, Editor of *Iron Age.*

The Trade Journal—John Frey, Editor, *Moulders' Journal.*

Thursday, October 27, 12 m.

Penn-Harris Hotel

LUNCHEON MEETING OF THE INDUSTRIAL EDITORS' ASSOCIATION OF PENNSYLVANIA.

Value of the Employe Magazine.—Miss Anna Bezanson, Department of Industrial Research, University of Pennsylvania.

Co-operation of the Industrial Editors with the Department of Labor and Industry.—Dr. Clifford B. Connelley, Commissioner.

Thursday, October 27, 2 p. m.

House of Representatives' Hall

MEDICAL SUPERVISION IN INDUSTRY.

Plan for Industrial Medical Clinics.—Dr. Mervyn Ross Taylor, Philadelphia, Pa.

The Doctor and Educator as Promoters of Efficiency in the Industries.—Dr. Seymour White, Evanston, Ill.

The Rehabilitation of the Industrial Cripple (Illustrated by Lantern Slides and Motion Pictures.)—General Lewis T. Bryant, New Jersey Commissioner of Labor.

Thursday, October 27, 8 p. m.

House of Representatives' Hall

WORKMEN'S COMPENSATION.

Progress in Compensation.—Hon. Robert E. Lee, Chairman, Workmen's Compensation Board, Maryland, and President, International Workmen's Compensation Boards and Commissions.

Compensation Legislation.—John B. Andrews, Secretary, American Association for Labor Legislation.

Interstate Commerce and the Supreme Court of the United States.—Hon. Harry A. Mackey, Chairman, Pennsylvania Workmen's Compensation Board.

SAFETY EXHIBITS

An Industrial Welfare Exhibit is being held at the Penn-Harris Hotel in conjunction with the Conference.

Safety Engineering

Vol. 42 NOVEMBER, 1921 No. 5
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Sudden Fires and Valuable Records

THE spectacular pictures below belong to Erie Railroad history. SAFETY ENGINEERING has published many similar pictures.

Five years ago the Secretary of the Treasury of the United States said: "It is poor policy to store valuable contents, found usually in Federal buildings, in any structure which is not fireproof from basement to the top of the roof." Instructions were given to the supervising architect of the Department to produce a construction in new Federal buildings that would safeguard important papers. Many banks, insurance companies and other institutions maintain detached buildings, built to resist fire, and equipped with metal furniture and filing cabinets.

In the protection of valuable documents, European countries are far ahead of the United States, particularly their historical societies.

Photo by O. F. Browning, N. Y.

The picture above shows a part of the debris after the fire at the Erie Railroad Terminal, Weehawken, N. J., on November 3, 1921. The white spots, conspicuous on the mound, are said to be the remains of valuable papers.

(Insert.) Snapshot of an Erie employe endeavoring to save blueprints after the famous cigarette-chlorate catastrophe on May 26, 1917, which had its origin in the Jarvis Warehouse.

The Purposes and Results of Safety Inspection Work from the Insurance Companies' Point of View

By William J. Venning

Supervising Safety Engineer, New York Branch, Aetna Life Insurance Company

Proceedings of the American Society of Safety Engineers

THE purpose of safety inspection work by an insurance company is primarily to conserve life and property by the prevention of accidents.

The need for systematic effort along these lines has been recognized for only a comparatively few years, but is becoming increasingly apparent as the subject receives more consideration. The most reliable statistics available estimate that in the United States during the year 1917, 90,000 people were accidentally killed, 11,250,000 suffered disabling but non-fatal injuries, and that the economic loss from these personal injuries reached $4,500,000,000. This appalling figure, however, does not represent the entire cost of the accidents as consideration has been given only to the loss involved in the human wreckage; and, to this must be added the unknown but enormous loss resulting from destruction of property. No mention has been made of the physical and mental suffering of the victims and their friends and relatives, which is sufficient reason in itself to justify all the efforts being made for the prevention of accidents.

Obvious as the need appears, in the light of these statistics, no great amount of attention was given the subject by industry in general until the passage of compensation laws made payment of compensation to injured employes compulsory. Some of our large industrial concerns, the United States Steel Corporation in particular, were the pioneers in this movement in this country, and the fine results obtained by them have been a decided factor in the progress of the safety movement.

The liability insurance companies early recognized the value of inspections by men with a knowledge of accident causes and trained to detect and suggest remedies for conditions which were liable to cause accidents. The decrease in accidents, resulting from such inspection service, kept to a minimum the losses which the insurance company paid, and this saving was reflected in lower rates for the policyholder.

Then, too, the average assured appreciated the inspection service which told him of potential accident hazards and enabled him to eliminate them before the accident occurred, thereby permitting him to operate his equipment more continuously and safely.

The three principal coverages under which safety inspection work is of the greatest value in preventing accidental injury to persons are elevator, public or general liability, and compensation.

ELEVATOR COVERAGE

Elevator liability insurance indemnifies the assured for loss on account of personal injuries received by any person not in his employ and by reason of the elevators, hoistways, and equipment.

The aim of the insurance inspector is to make sure that the elevator equipment is in such a condition that it presents the least possible hazards. The number of inspections made annually to determine this condition depends on the use of the elevator both as to purpose and extent. Thus, a passenger elevator in an office building where it is constantly in use, should be inspected more frequently than a freight elevator in a factory where the elevator is used only a part of the time.

The inspector should realize that the safety of many people depends upon the efficiency of his work, and examine carefully each part of the elevator in order to be sure of its safe condition before he

passes it. The ability of an inspector should not be doubtful. He must be able to determine when cables, controlling apparatus, safety devices and other parts of the elevator are unsafe. Since a large percentage of all elevator accidents occur at the elevator entrance the inspector must see if the protection provided at that point, as well as the enclosure of the hoistway on each floor, is ample.

If recommendations for improvement are necessary they should be of a practical nature and the inspector should be capable of passing on the repairs when made.

Millions of people are carried on elevators every year with surprisingly few accidents; the public has the utmost confidence in the safety of the elevators they use. It would be most interesting to know, were it possible to determine how much of this safety in operation is due to efficient inspection. Probably no elevator policyholder would care to dispense with inspection service to make a test of this matter.

GENERAL LIABILITY

General liability insurance indemnifies the assured for loss on account of personal injuries received by any person not employed by the assured while on the premises included in the coverage, or the premises adjacent thereto. Elevators may or may not be covered, depending on whether the assured desires this elevator coverage.

When inspecting under this form of insurance the inspector should note any condition in or about the premises which is liable to cause accidents involving personal injury. He should be sufficiently familiar with building construction to detect any unsafe conditions in the foundations of buildings, the walls, floors, floor supports, floor loading, roofs, etc. Tanks and their supports, especially on the tops of buildings, copings, skylights and chimneys should be examined. Stairways, fire-escapes, and exits should be carefully looked over to determine both the need for repairs and additional installations, especially in old buildings not designed for their present use. Any defective conditions in the sidewalk, yard, coal holes and covers, awnings, gratings, and any other condition likely to cause accidents should be noted, and, if practical, recommendations made for correcting them.

WORKMEN'S COMPENSATION

Workmen's compensation insurance protects the assured against loss by reason of the liability imposed by the State Compensation Law for accidental injury to his employes.

Under this form of coverage, the inspector not only deals with the elevator and building hazards mentioned previously, but he is interested in all plant operations and conditions which are likely to cause accidents. The equipment used in the transmission of power from the prime mover to the individual machine is looked over to see that no unnecessarily hazardous conditions are present. Each machine is inspected for dangerous belts and pulleys, or other moving parts, and all machines performing a cutting, shearing, or squeezing operation are noted to observe whether a guard at the point of operation has been provided or is necessary to reduce the danger to the operator.

All operations are studied to detect improper handling of explosive or flamable materials. Ventilation, light and sanitation receive their share of the inspector's attention; and, where the nature of the work requires, for its safe performance, the use of goggles, respirators, or protective clothing, the inspector is supposed to report whether or not these protective devices are being used. In fact, everything that has a possible bearing on the accident record of the plant is of interest to the inspector. It is not so difficult to determine after an accident what conditions should be changed to prevent a recurrence, but to walk through a plant and determine those conditions most likely to cause accidents in the future requires considerable training and ability.

In addition to the strictly accident prevention duties of the inspector mentioned above, he has to obtain considerable information which is used in determining the proper rate to be charged for the compensation insurance; therefore, a brief explanation of the principles used in computing the rate may be permissible at this point.

COMPENSATION MANUAL RATES

The Compensation Manual shows the base or manual rate for each of the 953 classifications listed, and theoretically at least, that is the rate which should be charged the average plant conducting operations described by the classification. But the question of what is an average plant naturally arises, as no two plants are exactly alike in both equipment and layout. Obviously, a plant located in a modern fireproof building and well laid out with ample aisle and machine space, with individually driven machines provided wth all the necessary safety devices, should pay a rate lower than another plant performing similar operations but in an old, poorly constructed and poorly lighted building, with little or no provision made for safety. In order to measure as accurately as possible the relative hazards in manufacturing plants doing the same kind of work, the Industrial Compensation Rating Schedule was prepared. This schedule covers 24 different items which are the principal causes of accidents in plants, and standards are given describing the protection which should be provided. The inspector notes all these conditions in his report so that credits may be given for standard protection and charges made for substandard conditions. The total of these credits and charges determines the net credit or charge which is applied to the Manual rate. If the net result is a credit, the plant is considered to be above the average, and conversely the adjusted rate is below the Manual rate, while, if the net result is a charge, the plant is below the average, and higher rates are charged.

EXPERIENCE RATING

The rating just described is called schedule rating and this plan was designed to measure the variations in physical conditions between plants performing similar operations. There are, however, differences other than physical between two plants which affect the accident records, such as attitude of the management toward accident prevention, labor turnover, class of employes, piece or time work, etc., and in order to measure these variations, another rating plan called "Experience Rating" is used. In the application of this plan, the losses incurred during a certain period are compared with the premium received during the same period and a credit or charge obtained, depending on whether or not the premium has been sufficient to cover the losses. The Manual rate is further modified by this factor so that the rate at which the insurance is finally written is the Manual rate modified by the factor obtained from application of the schedule rating plan and further modified by the application of the experience rating plan, as stated.

The inspector has little or nothing to do with the actual application of the experience rating plan, but it is a good measure of the effectiveness of his accident prevention work in the plant, for the thorough inspector is the one who can, after studying the plant accident record and making a survey of the conditions in the plant, devise ways and means of keeping to a minimum the losses from accidents and get the management of the plant sufficiently interested to put his plan into successful operation. This requires considerable ability along several lines. He must have sufficient mechanical ability and knowledge of general plant conditions to make practical recommendations for changes and improvements; he must be familiar with a large number of protective devices in order intelligently to recommend their use; he must keep posted on the methods successfully employed to stimulate interest in accident prevention work, and finally, when he has worked out to the best of his ability the proper plan to apply in any individual plant, he must have sufficient sales ability to put that plan across with the management, the foremen, and the employes.

We have tried to show that the aims of our inspection work are correct and we are satisfied that our work is producing results. The most convincing evidence we can offer of its effectiveness is our thousands of satisfied policyholders who believe that they are receiving at least as good inspection service as they could obtain elsewhere.

Taking Care of the Industrial Cripple

By Lewis T. Bryant

Commissioner of Labor, New Jersey

Proceedings of the Pennsylvania Industrial Relations Conference

IN considering the subject of the rehabilitation of the industrial cripple, the Rehabilitation Commission of New Jersey has approached the matter first with the idea of attaining the very greatest physical improvement and, later, endeavoring to have the worker placed in the very best possible position to earn his livelihood that the degree of his handicap will permit. The question of placement naturally carries with it the determination of the advisability of training, either institutional or in a shop on production, as against the direct and permanent placement on such work as the injured is capable of performing. As we see it, there can be no argument as to the absolute advisability of first using every reasonable endeavor to remove as much of the physical handicap as may be possible by means of an operation, medication, or orthopedic treatment, including the use of suitable exercising devices. This treatment may in many cases be profitably supplemented by the use of artificial limbs, orthopedic braces, or other appliances.

INDUSTRIAL UNITS AND CLINICS

In order to carry out our proposed program, it has been deemed advisable to co-ordinate the work of the Rehabilitation Commission with the activities of the compensation court and the employment offices. To this end we have established in each of the larger sections of the State an industrial unit, in which is housed a room for compensation hearings, a rehabilitation clinic and the employment service. Each clinic has a complete equipment of the apparatus necessary for various types of electrical treatment, baking, massage, and a complete set of machines for exercising injured members. The clinics also have an operating room for closed surgery, and open surgery of a minor character. The apparatus includes in each case an Albee table and a spinal extension tripod. An X-ray outfit is provided, and, in the larger clinics, a pathological laboratory.

ADVISORY BOARDS OF SURGEONS

An arrangement is made in each community for the services of a surgeon of the highest standing, who is known as director of the clinic, and who has the support of an advisory board composed of leading surgeons representing each of the hospitals of a given community. In this manner, the injured citizen is afforded an expert diagnosis of the highest character, and has an opportunity of securing the most approved treatment. The director of the clinic is also the medical and surgical adviser for the deputy commissioner of compensation administering awards, and it is the policy of the State to first see that handicapped workers are restored to the greatest possible degree of efficiency before the money compensation is determined. In a large number of cases this practice has made it possible to materially reduce the degree of the injury and largely simplify the work of the Rehabilitation Commission.

VOCATIONAL TRAINING, REMUNERATIVE EMPLOYMENT

A representative of the vocational training and placement branch of the Commission is attached to each unit, and it is a part of his obligation to see that the question of training and placement is given consideration in conjunction with the clinical treatment. In this way, the course to be pursued, and frequently the necessary contact with employment, is made before the worker has undergone his full course of treatment. It is the desire of the Commission that every effort be extended to the end that each applicant for compensation may return to remunerative employment under the best possible circumstances, and with the least delay that conditions permit.

The advisability of having the employ-

ment offices immediately adjacent to the compensation courts and the rehabilitation clinics is apparent. The employment offices are in most cases operated in conjunction with the chambers of commerce, and are in a position to provide a large number of openings for placement which would not otherwise be as quickly available. Obviously, an employment office cannot be operated with the idea of providing openings for handicapped workers, but in many cases circumstances are such that a worker of this character can perform service equal, and, in some instances, superior, to one who is entirely able-bodied.

The co-ordination of these several activities has worked out in practice to such an extent that while we opened one unit as an experiment, we have since increased the number to five, which cover the principal industrial portions of the State.

INTELLIGENT PLACEMENT OF HANDICAPPED WORKERS

The work of the Commission along the lines of vocational training and guidance has consisted largely in intelligent placement of handicapped workers in positions which they are capable of filling. In a few instances, we have arranged for attendance at industrial schools, but in a large majority of cases we have deemed it advisable to place the worker directly in a suitable position which has been developed through the employment service or by contact with the local factory inspector. It is the duty of the rehabilitation placement official to follow up these cases and see that their industrial connection is all that it should be. In some instances, we have obtained positions during the daytime and arranged for a night course in a suitable school. While we do not underestimate the advantages of schooling for the younger worker, in the majority of cases this course seems impracticable for the reason that the advanced age of the handicapped worker necessitates promptly obtaining an income for the support of dependents.

UPON A BASIS OF PERMANENT ACTIVITIES

The activities of the clinic and the rehabilitation placement service are available to all citizens of the State more than 16 years of age, and it is the endeavor of the Rehabilitation Commission to make available its services to the largest number of the citizens of the State. It would seem more reasonable to furnish a considerable degree of assistance to a large number of citizens than to expend the appropriation by providing extensive training for a relative few. While this work is new with us, as it is with other States, it is felt that the success obtained has placed it upon a basis of the State's permanent activities.

"Waste in Industry"

THE final report of the Committee on Waste in Industry, announced as forthcoming in the August issue of SAFETY ENGINEERING, is now out in bound form, published by the Federated American Engineering Societies, with a foreword by Herbert Hoover. It comprises three parts, as follows: Summary of Detailed Reports, Engineers' Field Reports, and General Reports (of a statistical nature).

The thoroughness of survey in the six industries on which engineers' field reports are presented is such that it is to be hoped that funds will be found with which to undertake the completion of the suspended studies in the pulp and paper industry, the rubber tire manufacturing industry, transportation and coal mining.

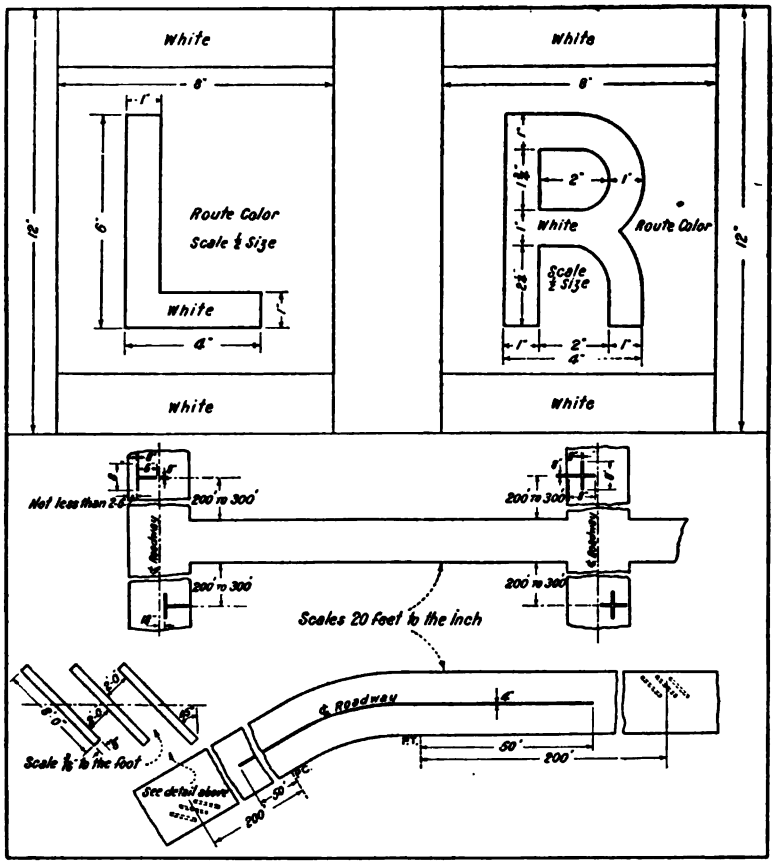
Three of the general reports, in addition to parts of all the field studies, are of particular interest to readers of SAFETY ENGINEERING: Industrial Accidents, by Sidney J. Williams; Health of Industrial Workers, by Dr. Eugene Lyman Fisk, assisted by Dr. C. T. Sharp; and Eye Conservation, by Dr. Earle B. Fowler. The last mentioned is a concise treatment of eye hazards, vision defects, and industrial illumination.

Uniform Road Warnings in Massachusetts

IN order that there may be uniformity in the marking of warning signs on the surface of Massachusetts roads, A. W. Dean, chief engineer of the Division of Highways, has sent a letter and a blueprint to all district engineers. The blueprint shows markings for curbs, crossroads and unusually dangerous corners. On the blueprint there is also a standard size for marking letters on the colored route bands. The markings for crossroads and branch roads should be placed only at the approaches to roads of considerable importance and are not to be placed promiscuously wherever an intersecting road or driveway crosses the highway.

The three diagonal bars for warning signs are only to be placed at the approaches to points where unusual care is necessary. They should not be placed at the approaches to all curves, but only such as are very sharp or for any reason unusually dangerous. They may be placed also at approaches to crossroads or intersecting roads that are much used and are "blind," the idea of the diagonal bars being that they should not be used so generally but that the public using the road will consider them as unusual and, therefore, requiring unusual care.

The letters on the colored bands are practically self-explanatory. The "L" and "R" should be used respectively



Courtesy of Mass. Dept. of Public Works, Division of Highways

Road symbols to provide uniformity in the markings of warning signs on Massachusetts roads

where the main road to be traveled turns to the left or right. In case there is no turn, no letter or other marking should be placed upon the bands. Letters should be placed on the sides of poles so that they will be plainly visible to the person approaching the pole.

With the use of the sign similar to the letter "T," the stem of the "T" points in the direction of the intersecting road.

The State authorities hope that these signs will be adopted by municipalities, in place of the lettering and other signs that are used in such variety that motorists cannot be expected to read or understand them. The efficiency of the white line at curves was so promptly recognized that in some places the authorities have run wild in trying to enlarge upon it, painting any number of cross walks, lettered warnings, stars, bars and directions which cause more confusion than they do good.

With three simple signs the State authorities believe the cause of safety on the roads will be much better served. The state will use no lettering on any of its roads.

Flexible Steel Rope Inspections

W. VOIGTLANDER, assistant engineer, John A. Roebling's Sons Company, in a talk before the Philadelphia Section, Association of Iron and Steel Electrical Engineers, published in the *Journal of the Engineers' Club of Philadelphia,* says of wire rope inspection:

The purpose of inspection is to secure as long a service from a rope as is consistent with safety. Through numerous inspections of traveling cranes, for example, it was found when comparing the service rendered by cranes using the same size rope, that local operating conditions together with crane design may vary the service from one day to three years. The factor of safety for the size rope taken (6 x 19) varied from 3. to 7.2. We have further found that where cranes have given from 9 to 12 months' average service, the factors of safety have a large range, such as 21, 16, 11, 8.5, 7, 5.5 and 4.6.

You will, therefore, see that inspection should be based on average lift of ropes for each individual machine. The inspection is to determine the number of broken wires allowable or the maximum reduction in rope diameter due to abrasion or to a combination of the two conditions. Where each strand contains the same number of broken wires per given length the loss is considerably less than if the majority of broken wires occur in one strand. This is best shown in tests in which a total of 12 wires were cut in each rope, showing a loss of 16½ per cent and 25 per cent respectively. These tests are all based of course on no broken inside wires, and if the ropes are properly lubricated it is rarely found that the inside wires break in service.

The loss in strength of 6 x 19 ropes with a given percentage of outside wires broken is a trifle greater than for the same percentage of outside wires of the 6 x 37 construction and if the figures in the above mentioned slide are converted to per cent basis, conservative values will be secured for allowable number of broken wires in 6 x 37 construction.

ABRASION SELDOM CAUSE OF FAILURE

When considering *abrasion,* the loss in strength in a 6 x 37 rope for a given percentage reduction in diameter is a trifle greater than that for the same percentage reduction in a 6 x 19 rope. It has been our experience that only in a very few cases does abrasion feature as the major cause of rope failure. Especially on equipment in steel plants we find that the majority of ropes are condemned due directly to broken wires. Abrasion may cause the wires to break sooner than otherwise, but even this condition depends upon the design and operating condition of the individual machines.

Making Coal Mining a Safer Job

ACCORDING to the United States Bureau of Mines, 970 men were killed by accidents in coal mines during the first half of 1921, against 1,093 during the first half of 1920, a decrease of 123, or about 11 per cent. For the same months, the output of coal was 242,000,000 tons in 1921 and 301,000,000 tons in 1920, a decrease of 59,000,000 tons or nearly 20 per cent. The fatality rate, therefore, for the first half of 1921 was 4.01 per million tons mined against 3.63 per million tons mined in 1920.

During the past 14 years, the number of miners killed for every 1,000,000 tons of coal mined has been as follows:

Year	Killed per million tons	Year	Killed per million tons
1907.....	6.78	1914.....	4.78
1908.....	5.97	1915.....	4.27
1909.....	5.73	1916.....	3.77
1910.....	5.62	1917.....	4.14
1911.....	5.35	1918.....	3.80
1912.....	4.53	1919.....	4.24
1913.....	4.89	1920.....	3.50

To read aright the slight increase in the 1921 records of fatalities per 1,000,000 tons produced, the number of miners employed this year as compared with last year would be interesting to know, but the information apparently is not immediately available. However, there seems to be no room to doubt that the fatality rate in coal mining has been steadily diminishing during the 14-year period. In 1907, one miner died for every 147,407 tons produced, while in 1920, 285,700 tons were produced before a fatality was reported. Tested in another way, the fatalities in mines for every 1,000 employes, 4.76 in 1907, was reduced to about 3 in 1920.

Some recent advices to SAFETY ENGINEERING indicates that accident prevention work in the mining industry is showing results.

Commenting upon the 1920 report of the Bureau of Mines, the Department of Safety of the Consolidation Coal Company of Fairmont, W. Va., of which Mr. J. W. Reed is director, says:

The number of lives lost, per 1,000,000 tons of coal mined, for 11 months of 1920, was 3.39 in all mines of the United States. The lives lost per 1,000,000 tons of coal mined by the Consolidation Coal Company in all of its mines was 1.50 for the whole year 1920, less than half the fatality rate for the entire country for 11 months.

In 1920 our mines show a reduction of one life lost per 1,000,000 tons of coal mined over 1919. In 1919 there were 2.5 lives lost per 1,000,000 tons of coal mined at our mines, while the loss throughout the mines of the United States was 4.28 per 1,000,000 tons of coal mined.

Another set of comparative figures will serve to show that mining is not the most dangerous occupation by any means.

Statistics show that 181 persons of every 100,000 in the United States annually meet with accidental deaths. The principal causes of these accidents are: burns and scalds 18%, automobiles 17%, falls 14%, drowning 17%, etc.

Our company employs approximately 10,000 men, and during the year had 12 fatal accidents. It will be seen that ordinary persons, including women and children, going about their daily routine, are about as liable to be accidentally killed by burns or scalds, or automobiles, or falls, or drowning, as is the miner at his work, for burns, scalds, automobiles, falls and drowning cause every year slightly more than one accidental death for every 1,000 persons in the United States, while fatal accidents in our mines for 1920 were but 1.2 per 1,000 men employed; and if we take all the accidental deaths which happen to all the people of the United States each year, we find 1.81 per 1,000 men employed.

All this shows that while coal mining may not be the safest work in which man can engage, it is nevertheless safer by far than the aggregate occupations of all the people of the United States, including women and children.

J. Edward Horn & Co., of Phillipsburg, Pa., have the opinion that the work in Pennsylvania under the compensation laws has considerably reduced the number of serious accidents, although particular application of the laws, in the opinion of this firm, might be changed for the better. The laws and regulations, Messrs. Horn & Co. say, could be made somewhat flexible, affording the inspector leeway to use his own judgment rather than being compelled to follow blindly the rules in a book. As an illustration Horn & Co. remark:

"For instance, we have an operation within three-quarters of a mile of the State hospital, which is especially adapted

for taking care of accident cases. There is always at least one doctor in attendance in the hospital. Under the rules of the Workmen's Compensation Insurance Board we are required to maintain an adequate dressing station on the surface at this mine. This room must be heated at all times during the winter. There is positively no occasion upon which we would use such a room. We never have used it, as, of course, the thing to do is to rush an injured man direct to the hospital, which we can do in less time than it would take to examine him in our dressing station. Yet the insurance inspector, under his rules, must require this room, and if we did not provide it, he would be required to make our insurance rate higher."

Horn & Co. believe also that a workman should pay some very small amount as the cost of his insurance, the amount to be varied in proportion with the safety standard at his place of employment. This practice, in their opinion, would interest the men in co-operation toward maintaining the desired safety standard.

Mr. William Hahman, prominent in the coal mining business in Pennsylvania, observes that while fatalities and serious injuries have decreased, the reports tc compensation boards probably show an increase in the total number of "injuries" received by miners, which circumstance he explains as follows:

"I can say that since the legal requirement of compensation insurance for injury sustained, the number of mine injuries has increased very considerably. Now when a man drives a nail and accidentally hits his thumb with the hammer, he goes to the accredited physician of the insurance company, has the member dressed and the accident is reported as a 'mine accident' and the man is put in line for compensation for loss of time. A few weeks ago, I heard that a man who had run a splinter into his finger went to the doctor to have it treated as a 'mine accident.' We did not hear of these things in the old times."

The *Mutual Monthly Magazine* of the Consolidated Coal Company has cautioned miners against the following coal mine dangers during the current year:

1. Sitting along the rib as motor pushes cars.
2. Getting too close to room switches where wrecks are likely to occur.
3. Keeping detonators too near other explosives.
4. Placing miner's lamps near cans of blasting powder or other explosives.
5. Smoking or lighted lamps near coat while eating lunch.
6. Locating magazines too near mining towns.
7. Keeping sharp tools, especially picks, on the ground; they should be stood up against the rib.
8. Omitting to set the last prop at the face.
9. Riding between cars on the trip.
10. Not fencing off a dangerous place where a shot has failed to go off or a loose piece of roof has refused to be dislodged, and not reporting it as dangerous to the foreman before leaving the mine.
11. Getting off motors in front instead of at the side.
12. Putting fingers on top of blocks instead of at the side when trying to slew wrecked cars back onto tracks; jacks may slip and let cars fall. Long blocks are the best to use, so as not to reach under the car.
13. Following slopes or rope haulways instead of manways.
14. Drilling out a failed shot instead of drilling a new hole, returning the same day to a failed shot, or going far enough away from a shot not to be sure what shot it is when an explosion follows.
15. Not keeping one hand on the wheel when it is necessary to pull on the brake stick in dropping a car under the tipple.
16. Not setting center posts as props to protect miner who is putting up a cross bar under bad roof.

The accompanying table, analyzing the 1920 accidents in the mines of the Consolidation Company, is also a statement of the most frequent causes of accidents, fatal and otherwise.

DEPARTMENT OF SAFETY

News and Suggestions for the Safety Men

IF YOU DISCOVER A WAY OF DOING A THING SO THAT THE DANGER FROM ACCIDENT IS REDUCED, OR ORIGINATE A DEVICE THAT MAKES FOR SAFETY, SEND IT IN TO THIS DEPARTMENT, SO THAT ALL MAY BE BENEFITTED.

Analysis of Accidents for 1920. + Indicates Increase

CAUSES	Total	Fatal	Permanent	Severe	Decrease over 1917
INSIDE THE MINES					
Falls of Rock or Roof Coal—					
Working under loose roof	60	2	2	56	− 2
While taking down roof	13	....	....	13	− 22
Returning under bad roof	2	1	....	1	− 20
Road ways and traveling ways	5	....	....	5	− 12
On machine man at work	9	1	....	8	− 0
Miscellaneous	1	....	....	1	− 2
Side Fall—Rock or Coal—					
Working near loose ribs	11	....	....	11	− 1
Taking down loose material	22	1	1	20	+2
Obstructions—path to safety	2	....	....	2	+2
On machine men at work	1	....	....	1	+1
Haulage—Cars, Motors, Rope					
Riding front or between cars	16	....	....	16	− 37
Couplings, standing between cars	22	....	1	21	−8
Putting on wrecks	26	....	1	25	− 7
Careless handling cars	4	1	....	3	+4
Falling alongside trip	14	....	....	14	+2
Close posts or places	18	....	....	18	− 22
Braking, spragging cars	9	....	....	9	− 13
Wrecks, runaway cars	27	1	1	25	− 7
Between top of car and roof	13	....	....	13	+13
Holding switch latches	7	....	1	6	+3
Run over while handling car	6	....	1	5	− 24
Working on sandpipe of motor	2	....	....	2	+2
Caught against face by car	3	....	1	2	+3
Miscellaneous	19	....	1	18	− 12
Electricity—Shocks, Burns—					
Contact 250 volts	1	1	....	....	− 3
Contact high voltage	2	....	....	2	+1
Miscellaneous	5	....	....	5	−0
Track Work and Timbering					
Setting timbers	12	2	....	10	+10
Pulling timbers	3	1	....	2	− 1
Falling, flying bodies	27	....	....	27	+13
Self inflicted sharp tools	11	....	3	8	− 0
Miscellaneous	2	....	....	2	− 1
Live Stock—					
Kicked	7	....	....	7	− 1
Squeezed, tramped	7	....	....	7	− 1
Caught by tail chain	4	....	1	3	− 1
Miscellaneous	3	....	....	3	− 7
Mining Machines—					
Jack slips, machine slews	7	....	....	7	+4
Caught in bits	2	....	....	2	− 0
Hit by falling jack pipe	2	....	....	2	− 7
Moving the machine	25	....	1	24	− 11
Miscellaneous	13	....	1	12	− 4
Explosives					
Delayed, misfired shots	2	....	1	1	− 0
Premature blasts	1	....	....	1	− 4
Hit by flying coal	4	....	....	4	+1
Miscellaneous	1	....	....	1	+1

CAUSES	Total	Fatal	Permanent	Severe	Decrease over 1917
Ignition of Gas—					
Lights	2	....	....	2	− 0
Other Causes Inside					
Struck in eye by spall of coal	17	....	....	17	+2
Struck in eye by small object	9	....	1	8	+5
Handling coal or slate	35	....	1	34	+11
Careless storage sharp tools	3	....	....	3	+3
Self inflicted sharp tools	6	....	1	5	− 1
Falls of persons	18	....	....	18	+9
Working on moving machinery	4	....	1	3	− 2
Lifting heavy bodies	18	....	....	18	+8
Miscellaneous	8	....	....	8	− 18
OUTSIDE OF THE MINES					
Shops, Machinery, Etc.—					
Self inflicted	4	....	....	4	− 7
Falling flying bodies	3	....	....	3	− 1
Falls of persons	2	....	....	2	+2
Working on moving machinery	2	....	1	1	− 0
Miscellaneous	3	....	....	3	− 0
Tipples, Chutes and Screens					
Coupling, standing between car	4	....	....	4	− 10
At mine car dump	2	....	....	2	− 5
Falls of persons	3	....	....	3	+3
Miscellaneous	5	....	....	5	− 6
R. R. Cars, Trim'g., Handling					
Handling R. R. Cars	1	....	....	1	− 2
Falls of persons	4	....	....	4	− 4
Miscellaneous	2	....	1	1	− 10
Construction, Reprs. Bldgs.—					
Falling bodies	....	....	....	....	− 2
Falls of persons	2	....	....	2	+2
Teaming					
Falling bodies	....	....	....	....	− 2
Falls of persons	3	....	....	3	+3
Miscellaneous	....	....	....	....	− 3
Other Causes Outside—					
Falling flying bodies	16	....	....	16	+13
Self inflicted sharp tools	....	....	....	....	− 16
Falls of persons	3	....	....	3	− 4
Miscellaneous	12	1	....	11	− 7
Special Causes—					
Nails protruding	16	....	....	16	+2
Infection, lack of treatment	11	....	....	11	− 6
TOTAL FOR 1920	671	12	23	636	− 221
1920 decrease over 1917	−221	−19	−19	−181	−221
1919 decrease over 1917	−160	−13	−13	−134	−160
1918 decrease over 1917	−219	−14	−11	−182	−219
Accidents prevented past 3 yrs	600	46	43	509	−600

Accidents Are Prevented By Personal Efforts.

Causes of 1920 Accidents in the Mines of the Consolidated Coal Company

Machinists' Identification Tag with a Safety "Pull"

THE picture shows a new identification tag (patent pending) which has come to the notice of SAFETY ENGINEERING. The tag is to be carried by machinists, tool and diemakers, automatic operators, milling machine operators, drill press hands, etc. The idea is that the tag be displayed upon the machine where the operator is working, that each man, when using a machine, should have a tag bearing his name and number attached to that particular machine. Thus the present practice of holding up two or more machines will be eliminated; not even one machine would be held up if not actually necessary to hold same while the operator is proceeding temporarily with other work. Machines, so checked, would assist timekeepers, foremen and inspectors in checking up.

OCCUPIED BY
OIL MACHINE BEFORE AND CLEAN AFTER USING—DO NOT DRILL OR TAP STEEL DRY.
HANDLE TOOLS WITH CARE—RETURN SMALL TOOLS CLEAN.
OBSERVE CARE TO AVOID ACCIDENT.
DO NOT CLEAN OR OIL MACHINES WHILE IN MOTION—REPORT DEFECTIVE GUARDS.
WEAR GOGGLES—WHEN NOT SURE ASK THE FOREMAN.

Immediately under the words "Occupied By" is a number corresponding with the tool check number. The band just below is for the employe's name. It is claimed for this device that it will overcome many evils now present in shops. Cut is a facsimile of the size of the tag.

INCREASES EFFICIENCY

The present practice is to place a toolholder or cutter in a machine to indicate that the machine is in use. This is a common sight, under this system, to see a lot of machines all taken and held in the manner mentioned above, when 50 per cent of them could be available for other operators who are inconvenienced and have to wait until such time as the operator holding the machines feels disposed to give them up, or until the foreman directs him to do so. The new check is to be given out with the 10-tool checks customarily given to new employes when they start work in a factory. If lost, the employees would be charged, as is the custom now when they lose a tool check bearing their number.

It will be noted further that the margin on the top of the name band is for a number corresponding with tool check number. The band is for the employe's name, stamped in by himself with steel letters.

When, for any reason, an employe leaves the firm, the band is readily taken off and a new band attached for the new employe, who is assigned the same number.

It may also be noted that important rules and instructions are printed on the face of tag, which prevent all excuses for not complying with them, as they are always in a position to be observed by the employe while the tag is in his possession. While the machine rules are general, the safety rules have the approval of safety engineers.

The tag has a moral side also, as the man has a name as well as a number. This will have an important bearing on his carrying out the rules, and a proper observance of them will result in the common good. Its economic and safety value can be readily understood. It overcomes many evils which are present in the shops.

CORPORATION OR FIRM NAME

The segment of the tag, below the rules (now shown in black), affords space for the name of the firm or corporation using the tag, or for any additional instructions to the machinist.

Editorial

"BOOZE" AND SAFETY

ON November 3, newspapers in the United States carried this press despatch:

YOUNGSTOWN, Ohio, Nov. 2.—Director of Safety David J. Scott was convicted by a jury in Common Pleas Court tonight on a charge of bribery relating to liquor law violations. Sentence was not imposed pending a motion for a new trial. Scott has been under suspension since charges were filed against him by a special Grand Jury last July which resulted in his indictment.

If guilty, David J. Scott should receive the severest penalty the law provides when the day comes for him to be sentenced. If guilty, he has offended against the Nation and the State, against morality and decency, and particularly against the responsibilities of the high office which made him the custodian of the banner of industrial safety in a great Commonwealth. If guilty, he has besmirched himself, his title, and to some extent, the good name and present influence of the Industrial Commission of Ohio.

This incident calls to mind the rather singular circumstance that article No. 1 in SAFETY ENGINEERING'S department known as "The Man On The Job," published in June, 1913, read as follows:

> *USE OF STIMULANTS.*—The *safety device or practice that has done the most in our plant to prevent accidents has been THE ABSOLUTE ELIMINATION OF THE MAN WHO BEFOGS HIS BRAIN WITH ALCOHOL. Ordinary "shop practice" takes care of the other things.*

We have wondered how it happened that this should have been article No. 1. In view of what has occurred in the world since that time, especially the Eighteenth Amendment to the Constitution of the United States, it might seem as though the hand of fate had something to do with it.

In Scott's case there was no accident. In its stead, if he is guilty, there was a deliberate purpose to violate the laws of the land.

We can think of nothing more fundamental among safe practices than article No. 1 in "The Man On The Job."

THE CALL OF THE A. S. S. E.

THE membership campaign of the American Society of Safety Engineers makes a strong appeal to those who are qualified to apply for one of the three kinds of membership, defined as follows:

Corporate Members.—A member shall be a graduate of a recognized technical engineering school or college who shall have been engaged in the practice of Safety Engineering for at least one year, or shall have been in responsible charge of important work of that kind for at least three years; the performance of the duties of a Professor of Engineering in a technical school of recognized standing shall be considered as an equivalent to an equal number of years of actual practice.

Associates.—Shall be connected with some phase of promoting safety for life and property.

Juniors.—Shall have such experience as will enable them to fill a subordinate position in Safety Engineering.

The Society has much to offer to its members: Monthly meetings at which, in original and carefully prepared papers, men who are authorities on the subjects they discuss contribute the benefits of their experience and outline the work of engineers to prevent accidents, these discussions covering a wide range of industries; members assist in the formation of safety standards for adoption by the States; they receive all of the proceedings of the Society and have access to (and full privileges of) the Library of the United Engineering Societies, including current technical periodicals and magazines; they have facilities for special research work

through the Library Service Bureau; they acquire professional prestige, likewise a welcome to the meetings of all other engineering societies in the United States and abroad through the introduction card of the A. S. S. E.

As previously stated by SAFETY ENGINEERING, the Society occupies a distinctive position among engineering organizations. It is devoted, wholly, to the prevention of accidents *by the development and application of engineering methods.* The Society recognizes the value of the work done by other organizations in popularizing safety, but it selects for its own activities the great field that American industries, which employ millions of workmen, offer for the prevention of casualties, fatal and non-fatal, by purely engineering methods.

It is believed that among the important industries of the United States several thousand men are qualified to join the A. S. S. E., in one or another of its membership classes.

In the great revival of industry, now beginning, the prevention of accidents by engineering methods is likely to reach a development far beyond anything hitherto attained. An A. S. S. E. button is a certificate of competency in the safety engineering line, competency by education and by experience.

CRITICISM OF "FIRE STOP"

To the Editor of SAFETY ENGINEERING:

SIR: In your June number, "Fire Stop" admits that he is "not a fire insurance underwriter," and from his statements and suggestions almost any one else would infer that he has little acquaintance with the business.

For some years there has been two plans of rating commissions paid to fire insurance agents; both of these take into consideration the classes of business sent in. These plans are: (1) the straight commission with contingent (which contingent added percentage was based on the agent's loss ratio); and (2) the graded commission of 15-20-25 per cent, with varying percentages paid for three different classes of risks, namely, special hazard, improved and preferred risks (mainly dwellings).

The National Board of Fire Underwriters, together with its branch. Underwriters' Laboratories, is an insurance - company - promoted organization. Most of the members of the National Fire Protection Association are, or were at one time, insurance men.

The reason why local agents are not fire preventionists is because fire prevention work requires mental effort; these agents generally need most of their mental energy for the promotion of State laws to drive insurance business into their receptive arms by the prevention of competition from outside insurance brokers, who do promote fire prevention by corrective recommendations to obtain reductions of rates.

Some of Mr. Untermyer's statements have been in line with the Hearst papers' statement that $400,000,000 in insurance money was taken out of this country by English companies last year. The facts are that only about $120,000,000 in premiums were written by these companies, and of this sum, with our saving American habits, we retained at least 50 per cent by means of our high loss ratio.

There is just one thing that prevents successful fire prevention work in the United States, and that is the folish American belief that "the insurance companies pay the bills." This can be cured only by laws making the wasteful American people financially and criminally responsible for every fire caused by neglect of fire prevention recommendations.

Give the United States the European laws fixing on individuals the financial responsibility for fires caused by their negligence, and in ten years we can give the United States a per capita loss of 50 cents instead of the present $3.00. Of course, the European loss record is only about 30 cents per capita, but they have been at it for some years, have better building laws and better all-around conditions. We might even in time reach the point where our fire department upkeep would be in line with that of the average European city, about one-tenth of our present cost.

W. M. WELLS, M. E.,
Fire Prevention Engr., General Motors Corp.

The Day of the Safety Engineer

By David S. Beyer

Vice President and Chief Engineer, Liberty Mutual Insurance Company

Proceedings of the Associated Industries of Massachusetts, Boston

LET me cite a typical case that occurred about a year ago in a plant within 50 miles of Boston. This is a prominent concern known all over the country and one that has had a safety department of its own for several years. After making a thorough study of its accident records, I called on the general manager and started out by telling him that he had a wonderful plant from the physical standpoint, which was true; that the buildings were all modern, of fire resisting construction, with plenty of room, maximum light, individual motor drives for nearly every machine and thousands of dollars had been spent on mechanical safeguarding; that from the viewpoint of physical hazards, it was one of the best plants in the State. When I got to this point in my preamble, the general manager said, "Wait a minute until I call my safety engineer." When the latter came in, the general manager said to him, "I want you to hear what Mr. Beyer is saying about safety conditions in our plant. He is starting out with so many nice things, I know he is going to tell us we are rotten before he is through!" And I said, "Well, you are just one jump ahead of me."

Then I told him that in spite of these conditions, their accident rate had shown practically no improvement over a period of five or six years, and that it was three or four times as high as other plants of which I had records where the hazard was equally great.

And then I went on to show him that the splendid work they had been doing in mechanical guarding had shown some good results in cutting down the mechanical accidents, but that 85 per cent of their accidents had nothing to do with machinery. They occurred from causes such as handling material, falling objects, falls of persons, nail punctures, flying particles in the eyes, etc. The general manager said, "Yes, but how can we prevent accidents of this kind?" And I told him that he could accomplish results in this line just as he could accomplish them in any other operating problem—by demanding the results from his organization, and distributing the responsibility right down the line through his superintendents and foremen to the men themselves.

He acted on this suggestion; a series of meetings were called, beginning with his operating heads and continuing until it reached the workmen in the yards and at the machines and the entire organization was tuned up to the idea that they were having a lot of unnecessary accidents and that these accidents could and would be prevented. Without going into further details, I can say that the safety department was given a new brand of co-operation because everyone in the plant was interested.

The results were immediately apparent. Within a few months the accidents were reduced 40 per cent, and for the first time in the history of the plant, they have recently gone for two weeks without a single lost-time accident to any of the more than 5,000 men. Every accident prevented in that plant brings about a direct reduction in their compensation premium, and I have every reason to believe that this saving will run into thousands of dollars by the end of the year.

The day of the "safety engineer" has come. The real safety engineer doesn't merely go into your plant and pick out a few more belts and gears to be guarded; he starts by getting a list of your accidents, and shows you how your accident frequency compares with that of other plants in the same industry, so you will know how much room there is for improvement; then he analyzes the causes of your accidents and tells you what is needed to prevent them. He is like the physician who diagnoses your illness and prescribes a course of treatment; he cannot take the medicine for you, but, if he is a real safety engineer, he can tell you the medicine you need.

The Employes' Magazine and Its Treatment of Safety

A STUDY of plant publications undertaken by the Editors' Committee of the Philadelphia Association was reported, so far as it had been completed, by Miss Anna Bezanson, of the Department of Industrial Research, University of Pennsylvania, at the Industrial Relations Conference held in Harrisburg in October.

The findings of the committee in relation to industrial safety and health work, although not presented separately in the report, are of sufficient interest to safety engineers and others responsible for safety work in industry to deserve careful note. They have been excerpted from the text and tables of the complete report and are presented herewith.

Of 144 companies stating their reasons for starting a paper, 11 set themselves down as actuated by the aim "to promote welfare and personnel work and teach principles of safety."

The avowed aim of five plants in publishing an employes' magazine is "to promote safety and health," and seven reported the greatest value of their papers as "promoting health and safety, especially by decreasing accidents."

Material submitted from another source than the direct correspondence of the Philadelphia Association's committee gives 271 opinions of the most valuable material in the plant magazine; of these 271 opinions, which represent the comment and in many cases the experience of editors, 19 give safety the credit of being the subject of greatest value for articles. Two others count health articles the most valuable.

HIGHEST PER CENT OF EFFECTIVENESS OBSERVED IN ACCIDENT REDUCTION

In answer to a question as to the effect of articles observed in specific instances, out of 62 corporations replying, 17 reported a reduction in accidents, and 12 an increase in health and community activities. Seven reported having secured suggestions and articles from employes. Those who reported the 17 reductions in accidents made these comments: "Marked reduction in casualties after editorial on Safety;" "Articles on Safety have been invaluable in the period of high production;" "Wonderful results with Safety, accidents now very rare; improvement in accident record almost entirely due to work in plant paper;" "Accidents greatly reduced." It was also reported that "athletic and all employe activities succeed better with a publicity organ; health and educational campaigns are made materially more effective."

Specific methods of attaining these results are suggested in the following table showing calculated effort on the part of 46 plant papers to reduce accidents:

ILLUSTRATIONS OF USE OF PLANT PAPER IN DECREASING ACCIDENTS

Methods Used	Corporations Reporting Number	Percent
1. Successful "Accident Campaigns" conducted through the paper	33	71.7
2. *Interdepartmental contests	8	17.3
3. Safety articles written by Plant Physician (2), Safety Engineer (1), Superintendent of Safety (1), or Accident Prevention Committee (1)	5	11.0
Total	46	100.0

*Specific methods mentioned in addition to articles are: Publishing accident records by departments, often comparing with average for the whole plant; reproducing graphic charts, often making comparisons; and use of "puzzle pictures," cartons and photographs of safety devices.

Excellent results are reported in more intangible ways than actually reducing the number of accidents. Comments say, "Health articles stimulated application for athletic association membership;" "Our health articles were largely read and discussed and other papers frequently republished them."

Life Insurance Companies and the Reduction of Industrial Hazards

IN a paper on "The Industrial Selection of Life Insurance Risks," which Austin D. Reiley, of the Mutual Life Insurance Company of New York, read at the Medical Section, American Life Convention, Excelsior Springs, Mo., and which was printed in *Medical Insurance and Health Conservation,* the environmental selection of life insurance risks as distinguished from their medical selection is presented as an effective means of reducing accidents in industry.

General selection of life insurance risks is divided into two categories—first, the medical selection; second, the environmental. Medical selection concerns itself with the physical condition and health history of the risk. . . . Environmental selection depends equally with the risk's own statements, on extraneous information furnished through the medium of inspection reports.

Besides occupation, environmental selection takes cognizance of residence, finances, age, dependence or independence, protective necessity of the insurance, moral character and surroundings, sex, race and hygienic or unhygienic mode of living. As only one phase of the subject is under discussion in the present paper, time will not permit me any detailed examination of environmental selection as a whole.

It is the best life insurance opinion that the effects of the examination (*i.e.,* medical) are felt on a company's mortality for not more than 5, or, at most, 7 years; at the end of which time the mortality is reduced to a community basis. On the other hand, the effects of environmental selection endure through the entire life time of the policy and cast a permanent influence over a company's experience. It is undoubtedly this permanency of effect which constitutes environmental selection's greatest value and profit to a company.

Occupational selection is probably the most important single phase of environmental underwriting.

QUESTIONABLE ENVIRONMENTS IN 55 PER CENT OF APPLICATIONS

In a standard life insurance company writing with considerable freedom among all classes, something like 55 per cent of all applications must be scanned carefully from the environmental standpoint, and of these something over 20 per cent are from hazardous and semi-hazardous industries.

Has life insurance a duty, in its industrial selection, toward industry as a whole? It is its duty to aid progress wherever it sees the opportunity. In this respect we are compelled to admit that we are behind accident and health and workmen's compensation companies. The magnificent work that has been done by this group in the field of Safety and Industrial Hygiene has never received its proper meed of praise. It is true that life insurance companies have not the same constructive opportunity. They can aid immensely, however, by promptly recognizing each forward movement in the direction of the conservation of industrial man-power. If the employes in one factory can obtain their insurance at a cheaper rate than the employes in another engaged in the same line of business by reason of superior working conditions, another powerful influence has been added to those already at work to compel the other factory to clean up. Whatever influence life insurance has in this regard can be exercised only through a thorough knowledge of industrial conditions and safeguards.

SURVEY AS BASIS OF PREFERENTIAL RATES FOR HAZARD-SAVING

The best method of charging preferred rates for cases with good surroundings of higher class has probably not yet been discovered.

A thorough knowledge of the occupation to be given preferential rating may best be obtained by a survey or "complete examination of all factors to be used in the selection of life insurance risks from an occupational standpoint."

Occupations that require careful selection are divided into 3 classes:

1. Occupations of accident hazard.
2. Occupations of health hazard.
3. Occupations of moral hazard.

A properly made industrial survey for life insurance purposes is composed of 3 distinct parts—the *field investigation* and general description, the *job analysis,* and *statistical study.* In certain surveys, one of these is for various reasons omitted. Where this is done it is always either the field investigation or the statistical study; the job analysis for obvious reasons is always necessary. There are certain great industries where a field investigation is not necessary, the all-important factor being the accidental death rate. These are for the most part trades such as the railroad and electrical industries where the hazard is wholly accidental. Again we are sometimes compelled to practically dispense with the statistical study because of the scarcity of information and depend wholly on the field investigation.

These are made for several purposes. In those industries where the processes are intricate and the materials handled dangerous to health it is necessary that we know:

1. The inherent danger in each department or job.

2. The necessary precautions that should be taken to combat these dangers.
3. The general trend of conditions in the industry and its attitude toward its own hazards.

CONSTANT CHANGE MUST BE RECOGNIZED

It is, in the highest degree, necessary to watch the general trend of conditions in industry. In the first place, as stated before, it is the duty of life insurance to industry in general. A life insurance underwriter passing on industrial hazards is charged with the duty of prophecy. He must recognize improving conditions and make his rate on the basis of what the future mortality will be, not what past experience has been. As a basis for charging industrial extras, life insurance experience is not a very good or very sure guide. An exception to this statement must be made in favor of the experience of the industrial companies; this is very valuable.

The underwriters, therefore, who are charged with the duty of selecting risks from the standpoint of occupation should make check-ups of conditions frequently, and be familiar with the general improvement in safety and industrial bygiene throughout various industries. This is important as much for their own experience and viewpoint as for any other reason.

Hazards in the Automobile Industry

THE Retail Credit Company, of Atlanta, Ga., in a recent issue of its *Inspection News Bulletin* presented as a basis for forming underwriting judgments a brief analytical report on the automobile industry. In general the hazard to life in the automobile plant is said to be remote. The plants are reported as mostly equipped with first aid stations, with trained nurses in attendance, and the light, heat and general working surroundings are classed as of a high grade. The occupational classification of employes gives the following information about the risks of employment:

DUST REMOVED BY SUCTION TUBES

In the motor department the machines used by the toolmakers are guarded, and air suction tubes take off dust or fine particles of steel.

Dry grinding is regarded as dangerous work, because the stone grinding wheels at times explode. Steel guards are placed around the wheels to guard against such accidents, and the men wear heavy goggles. The dust is carried off by suction pipes, but some of it escapes. The grinder is located where ventilation is the best, usually near windows. Wet grinding is not considered hazardous or injurious.

AUTOMATIC DRILL PRESSES

Drill presses and milling machines are automatic, and no hazards from accidents are mentioned, although the moving parts of the milling machines are well guarded.

In the heat treat department the laborers and heaters both may receive burns, though the work is not considered dangerous. In the block tester room air tubes are installed to carry away the gasoline fumes and the noise from the exhaust.

Before the installation of the air tubes to carry off the fumes from the gas, this work was considered unhealthful, as the men felt the effects of the gas.

In the rear axle department the machines are well guarded and hazards are few. The automatic drop hammers offer the danger of getting a hand mashed by something going wrong with the machinery. Accidents of this kind are few.

Punch press operators in the radiator department occasionally get fingers cut or mashed.

HEAVY PRESSES THAT MOVE SLOWLY

The largest machinery in the plant, the heavy presses which shape fenders, hoods, etc., in the sheet metal department, move slowly and give plenty of time for the workman to remove his hands. Enamelers in this department place the sheets in ovens for baking and are subject to the risks of overheating and oven explosions from disordered gas regulation.

No fatalities have occurred in this department, though recently an oven exploded, seriously injuring four men who were working at it.

Chicago and the Safety Movement

THAT Chicago is the Bethlehem of the Safety movement was emphatically proclaimed by Arthur H. Young in an address before the Ways and Means Committee of the Chicago Association of Commerce. This honor has been generally conceded to South Chicago, he said, as a result of government investigation.

"Back in 1905 and 1906, in the steel mills of the Illinois Steel Company, where, I believe," said Mr. Young, "the Coroner's records show that some 56 men were killed, or on an average of one each week, the old Black Maria backed up to the hospital gate and took away some worker who would never return to his family, or never see its gates again. Robert J. Young suddenly conceived the idea that accidents could be prevented, that making steel and killing men were not necessarily related and coupled. His decision caused him to investigate all of the accidents as they occurred. He realized most of them were preventable, and set about in a modest manner to stop the occurrence of these accidents.

"Now, I am perfectly well aware that back in 1847 some concern issued safety pamphlets, and back in Biblical times there were admonitions of 'Safety First,' and so on, but I do say that the first organized means of industrial safety were engendered in the Illinois Steel Company's south Chicago plant, about fifteen years ago.

"Now, what have been some of the results? Down at the South Chicago plant, accidents began to decrease, and deaths began to diminish, with a still greater number of men employed, and a still greater production called for from the plant. And by 1914, if I were to say to you, as a result of their accident prevention campaign, that deaths were only 50 instead of 56, you would say it was a good work—particularly if one of the 6 that had been saved happened to be in your own family. But, as a matter of fact, the deaths in that year fell to 7, and they have consistently remained around that figure ever since. And that is not alone true at the Illinois Steel Company's plant, it is in every plant of the steel corporation, it is in every plant of the Harvester Company, it is on every railroad, and the Eastman Kodak Company, it is in the lumber camps; it is all over, wherever organized Safety movement has been put to work. The results have been just as definite; a reduction of 80 per cent in accident frequency rate, of both minor accidents and fatal accidents.

"Our Safety Council here in Chicago is one year old. During that year we have conducted Safety supervisors' schools, and returned an average attendance of 500 each night, and we gave 10 lessons in accident prevention to foremen from industrial plants. Those who persisted in attendance throughout the course received a certificate, a diploma, and there were 365 of the 500 who maintained their attendance at 100 per cent. We conducted a foremen's instruction class, where 10 lessons were given to about 525 foremen from industrial plants, and 310 of them were graduated with perfect attendance. We had a motor drivers' instruction class; 6 lessons were given, with an average attendance of 600 motor drivers, drivers of trucks, mostly from the department stores and trucking companies here in this city. Four hundred and seventy-nine persisted in attendance, and were given a diploma of merit for what they had learned during that course.

"We had safety instruction in the public schools, as a result of the splendid cooperation of the Board of Education. They have worked out a booklet, furnished to each teacher in the schools.

"During July and August of this year the accidents to school children on the streets of Chicago were 10 per cent less than they were a year before.

"During 1920, the fatal accidents that occurred in Chicago were at the rate of 1,982 a year, or 38 a week; serious injuries and serious disabilities occurred at the rate of 49,500 a year, or 953 a week. The fire waste was $11,800,000. This year, deaths by accident will probably be 40 each week."

The Heating Boiler a Hazardous Necessity

IN 1920 there were 23 heating boiler accidents of the sort popularly known as explosions of a violent nature, plus nine similar explosions of hot water heating boilers, exclusive of cases reported as sectional cracks, ruptures and unspecified minor accidents.

Besides these 32 explosions reported as violent, there were 163 other reported heating boiler accidents, usually not causing damage to the surrounding property, or occasioning loss of life.

The total distribution of heating boiler accidents, in the order of their highest frequency, was as follows: November 49, January 30, December 29, February 21, October 20, March 12, April 11, May 9, September 5, July 4, June 3, and August 2.

Even some of the less violent explosions caused fatalities. These 32 explosions cost the lives of 6 victims, and injured 24 other persons, some of them seriously. (These figures were obtained from the *Locomotive,* published by the Hartford Steam Boiler Inspection and Insurance Company).

These heating boiler explosions and other accidents comprised nearly one-third of the 652 reported for all boilers, and caused 4.37 per cent of the 137 fatalities and 9.16 per cent of the other injuries. Their reports are probably less complete than those of power boilers, so that the comment of William D. Halsey, editor of the *Locomotive,* would seem to be just. Mr. Halsey says: "The heating boiler, taking the record of the whole country, probably has as bad a record as the power boiler. However, in our experience we have found that if a heating boiler is properly connected, if it is equipped with the proper safety devices, and if it is inspected, the hazard of the heating boiler is very greatly reduced below that of the power boiler."

Courtesy, Travelers Insurance Co.

Picture at top shows where a boiler in a Long Beach, Cal., hotel was uprooted by explosion. Picture below portrays the damage caused in a candy shop, where the boiler was deposited through the roof after the explosion.

Safety News and Comment

Industrial Health in A. P. H. A.

THE Industrial Hygiene Section of the American Public Health Association Health Institute held in New York, November 8-11, had as its chairman Dr. C. E. Ford, medical director of the General Chemical Company, New York. Under his direction the following demonstrations were arranged:

Industrial hygiene and welfare work of the New York Telephone & Telegraph Company.

Industrial hygiene work of the New York City Health Department.

Industrial hygiene work of the American Telephone & Telegraph Company.

Union health center, Medical Department and Industrial Clinics of National Labor Union.

Cost of industrial welfare, National Industrial Conference Board: exhibit of charts and discussions.

Industrial welfare work of the Metropolitan Life Insurance Company.

New Edition of Freitag

ONE of the most useful handbooks for fire insurance engineers is "Fire Prevention and Fire Protection as Applied to Building Construction," by Joseph Kendall Freitag, B.S., C.E. (John Wiley & Sons, Inc., New York).

A second edition has just been issued —pocket size, although it contains more than 1,000 pages and hundreds of illustrations.

Mr. Freitag's work has received the highest commendation from every authority on fire-resistive construction, architects as well as underwriter's engineers.

The chapter on factories is full of information for manufacturers who desire to protect their employes from the danger of fire which is the greatest single menace with which they have to contend. No catastrophe for which a manufacturer could be held responsible except, perhaps, a boiler explosion, is likely to kill so many employes as a fire and a fire panic.

Mr. Freitag's book shows the dignity to which the profession of fire insurance engineering has risen. The new volume is a really great work and the Wileys maintain their exalted reputation as publishers in the typographical beauty of the book.

F. P. Porter with DeKay Service

FREDERICK PHELPS PORTER, who for the past two years has been Inspecting Engineer for the Travelers Insurance Company, has become associated with DeKay & Company, Incorporated, 51 Maiden Lane, New York City. Prior to his joining the Travelers Insurance Company, Mr. Porter, who studied engineering in the Columbia University School of Mines, was for one year with the hull department of the Morse Dry Dock Company, in Brooklyn, converting freight ships into mine layers and other Navy auxiliaries. In 1917 and 1918 he was with the United States Shipping Board at their Downey Shipyard plant, at Arlington, Staten Island, where he held responsible positions in connection with the laying out of the 7,500-ton freighters being built at that yard.

Mr. Porter won first prize for the article, "Safety Teaching Post-Graduate Work," in the January issue of SAFETY ENGINEERING. He is a member of the New York Chapter of the American Association of Engineers, which is composed of the four Founders' Societies, and an associate in the American Society of Safety Engineers.

DeKay & Company, who will make a specialty of workmen's compensation insurance for employers, was incorporated for corporation insurance service early in 1921 by Eckford C. DeKay. Mr.

DeKay was for seven years connected with the New York State Insurance Department, where, as Compensation Rating Expert, he represented the Department on the underwriting, engineering and actuarial committees of the New York Rating Board. Mr. DeKay is a fellow of the Casualty Actuarial Society, and a vice-president of the American Society of Safety Engineers.

Mr. Porter will bring to DeKay & Company a high type of engineering experience combined with insurance knowledge, and will materially add to the service offered by his organization, which already includes in its directorate Joseph M. Stanford, president of Stanford, Hine & Fish, and a recognized authority on fire insurance ratings; Robert H. Moore, New York manager of the Federal Mutual Liability Insurance Company of Boston; Sidney G. DeKay, local counsel of the Pittsburgh Glass Company, and Dr. Frank Erdwurm, physician and surgeon. Hon. Charles S. Hervey, former deputy comptroller for the city of New York and later State public service commissioner under Governor Whitman, is also associated with the concern as consulting accountant.

Labor Urges Safety Campaign

A RESOLUTION urging the Ohio State Legislature to appropriate $150,000 for a State safety campaign was adopted by the Ohio State Federation of Labor in session October 11. The labor organization means to support by this move not only the institution of State factory inspection, but also an authoritative educational campaign among both workers and employers.

Ohio is already prominent among States caring for safety by statute law and industrial code. Though not at the top of the list, she has 12 hazards under regulation, 11 by special code, and one, abrasives and buffing, by statute. She is the only State having regulations for two industries. If her organized labor body has sufficient influence, she will soon join the few having factory inspectors to survey factories and see that they are equipped with safety devices.

Public Safety Service

C. W. PRICE, former general manager of the National Safety Council, and now retained as special consultant of that body, and W. R. Rasmussen, safety director of the Chicago Yellow Cab Company, have resigned their former positions, and with F. W. Pardee, former secretary and general manager of the Steel Trade Association, have formed the Price-Rasmussen Corporation. The purpose of this firm is to offer to city officials, chambers of commerce, automobile clubs, and private commercial organizations personal service in public safety. The new firm has its offices in the First National Bank Building, Chicago.

Alkaline Soil and Concrete

AT a meeting of the Canadian Honorary Advisory Council for Scientific and Industrial Research a question brought up for consideration was the deterioration of concrete structures in certain soils of western Canada. According to *Industrial Canada,* the presence of alkali in the soil is responsible. One instance is the Winnipeg water-supply conduit. An investigation is being made by a Research Council Committee, under the chairmanship of Professor C. J. Mackenzie of the University of Saskatchewan. Both chemists and enginees are participating in the investigation.

Graduation of Safety Foremen

GRADUATION EXERCISES in McCreery's Restaurant, Pittsburgh, Thursday evening, November 17, marked the conclusion of the largest and most successful Foremen's Safety School ever conducted by industrial plants in the United States. The graduating class numbered approximately 750, and each graduate received a diploma from the National Safety Council.

This safety school, for foreman of industrial plants in the Braddock district, was inaugurated by the general superintendent of the Edgar Thomson Steel Works, O. J. H. Hartsuff, and was origi-

nally intended for the instruction of his own foremen in safety matters. Later, however, Mr. Hartsuff widened the scope of the course to include foremen from all the industries of the district, and the various plants of the district were represented on the committee which had charge of arrangements as follows:

John B. Trusel (Edgar Thomson Works), chairman. J. A. Oartel (Carnegie Steel Co.), J. E. Lose (Carrie Furnaces), Thos. Crombie (McClintic Marshall Co.), S. Baum (Columbia Steel Shafting Co.), John D. Price (Wilson Snyder Pump Co.), Peter Toner (American Chain Co.), A. R. Blainer (Consolidated Expanded Metal Co.), A. M. Kremkau (Copper Clad Steel Co.), John Hockenberger (Benner Tool Co.), E. M. Patterson (Duquesne Light Co.), L. H. Lesimore (Nicholson Chain Co.), Jas. Weeks (Pittsburgh Machine Tool Co.), Jos. Tronsberg, Jr. (Acheson Mfg. Co.), B. D. Peters (Rankin Works, American S. & W. Co.), George Garver (Braddock Works, American S. & W. Co.), Jos. Connor (Sterling Steel Foundry), D. R. Ferguson, J. A. Morgan, David Scott, F. A. Power, F. H. N. Gerwig, Jos. A. Lawler, John Lloyd, and F. F. Slick (all of Edgar Thomson Works), W. Milroy (Union Railroad), F. R. Wilhelm (Pittsburgh Railways). All meetings were conducted by E. S. Willis of Wilkinsburg, Pa.

The auditorium of the Braddock Carnegie Library was packed to capacity for each session of the course, which consisted of addresses on safety subjects by Dr. R. M. Little (N. Y. Industrial Commission), J. A. Oartel (Carnegie Steel Co.), John Martin (Ohio Works, Carnegie Steel Co.), F. H. Trego (Pittsburgh), E. Friedlander (Edgar Thomson Works), and Dr. William T. Dorward (Milwaukee). Each address was supplemented by musical and vaudeville numbers by employes of the district, and the success of the whole course has been such that a number of other industries in the Pittsburgh district are contemplating conducting a similar safety course in the near future.

Safety Summarized by Trade

READERS of SAFETY ENGINEERING will be interested to observe that many of the important articles published in this magazine are being included in those covered by the new *Industrial Digest*, which abstracts selected informative articles from nearly 600 trade and technical publications. Digests from SAFETY ENGINEERING articles appear under the most appropriate of the following industrial classifications, with cross-references from other industries to which they are related:

Automotive; Building and Construction; Cement, Stone and Brick; Drugs and Chemicals; Electrical; Fuel, Coal and Power; Glass, Pottery and Jewelry; Machinery and Machine Products; Iron and Steel; Food and Beverages; Fish and Meats; Leather and Leather Products; Metals and Metallurgy; Mining; Oils and Petroleum; Printing and Publishing; Clothing and Garments; Rubber and Plastics; Sugar and Confectionery; Textiles; Paper and Pulp; Hardware and Paints; Lumber and Wood Products; Transportation; Cereals and Milling; Hotels and Amusements; Advertising; Financial; Economic; Exports.

Storage Battery Locomotives

THE United States Bureau of Mines has issued approvals of two storage-battery locomotives for use in gaseous mines. The first was issued to the George D. Whitcomb Company, and the second to the Jeffrey Manufacturing Company. Two other locomotives, representing the product of two additional manufacturers, are now under test. It is the belief of the Bureau that approved storage-battery locomotives will largely eliminate the hazards of the trolley locomotive and of the nonpermissible type of storage-battery locomotive.

The Unprofitable Oiler

A. ELLIS FRAMPTON, editor of the *Hammermill Bond*, speaking before the Pennsylvania Industrial Relations Conference, said that the problem of Industrial Relations is to assist the worker to make himself more profitable, and told this story of an oiler who needed such assistance:

"The oiler had worked in the same factory for ten years, making his daily rounds with ladder and oil can, and fell one day, injuring himself severely. The safety director, anxious to learn how the accident happened, went to the scene of the accident with the victim, and asked what had caused the fall. 'Well, every day I get up on my ladder and lean over this shaft to oil the hole in that shaft,' the oiler ex-

plained. The safety director looked closely, and turned around to the workman. 'How often do you oil that hole in the shaft?' he asked. 'Well, sir, I haven't missed a day in twelve years,' the oiler said, proudly. 'Then it's about time you learned that the hole you have been risking your neck to oil is the spindle hole on which the shaft was turned in a lathe,' was the safety director's last word on the subject.

This anecdote is not so much of a caricature as it may seem. There are thousands of employes in this country who are working with this spirit. This is one reason why employers complain with perfect justice that they have difficulty in picking men for promotion—so many of their men do not know their own jobs. They are not prepared for promotion, and they are most assuredly not as productive as they might be at their work.

Coal Mine Hazards and Accidents

THE United States Bureau of Mines has issued revised regulations for the testing of explosives for use in gaseous and dusty coal mines. A complete official test of an explosive to determine its permissibility for use in coal mines consists of physical examination, small lead-block test, rate of detonation, flame test, gallery tests, ballistic pendulum, explosion by influence, gaseous products of combustion, pendulum friction, freezing test by crusher board (for explosives marked low-freezing), chemical analysis, and if the manufacturer so desires, the pressure by Bichel-gage test. The new regulations are contained in Schedule 17, which may be obtained upon request from the Bureau of Mines, Washington, D. C.

* * *

Research work on acid-resisting equipment for use in coal mines has been begun under a co-operative agreement between the United States Bureau of Mines and the Carnegie Institute of Technology, Pittsburgh, Pa. The problem will include the collection of samples of mine water from various bituminous coal mines and the determination of the degree of acidity; a survey of the acid-resiting materials available for use in coal mines; and tests on the acid-resisting materials selected on the basis of this survey.

* * *

The Bureau of Mines reported this month comparative figures for mine accidents, the number of men employed; and the shifts worked during 1920. The data given for coal mines are estimated and not yet final, except the number of fatalities, 2,260. The fatalities in metal mines, quarries, coke ovens and metallurgical plants together total 713, or less than one-third of the number for coal mines.

* * *

Four thousand more men were employed in coal mining in 1920 than in 1919. And coal mine employes gained an average of 32 days for each of the 780,000 employed last year, according to the Bureau of Mines.

No-Accident Week Results in Chicago

THERE were 319 fire alarms in Chicago during the 1921 No Accident - No Fire Week, October 8-14. This was a decrease of 24 per cent from the average record of previous years for the same period, and involved fire loss and damage of $124,000, which was a reduction of one-half from the same average.

Fatal accidents numbered 28, and serious injuries 672; these figures are reductions, respectively, of 33 and 34 per cent from those of previous years' averages. Hence the greatest decrease apparently achieved by the observance of No Accident - No Fire Week is in the amount of loss and damage by fire.

Wilmington Foremen's Safety Club

FOREMEN from various industrial establishments of Wilmington, Del.. met October 17 in the plant of the New Castle Leather Company to organize a Foremen's Safety Club. To be eligible for this organization the foremen must have completed all the accident prevention courses previously given by the Delaware Safety Council. Subjects to be taken up by the new group include employes' councils and training courses.

Among the plants represented at the first meeting were the Electric Hose and Rubber Company, New Castle Leather Company, Joseph Bancroft and Sons, Krebs Pigment, duPont

Company, Bethlehem Shipbuilding Corporation, Pusey and Jones, Edgemoor Iron Works, Eastern Malleable Iron Company, Diamond Ice and Coal, Hercules Powder, Pyrites, Wilmington and Philadelphia Traction, Wilmington Gas, American Car and Foundry, Delaware Leather, Standard Kid and Bond Manufacturing.

Pittsfield G. E. Safety Rally

A NEW safety moving picture film entitled "The Hand of Fate" was exhibited at a recent safety rally held in the auditorium of the General Electric Company at Pittsfield, Mass. The film was made by the Liberty Mutual Insurance Company.

1,455 Men Killed at Mines, 1921

FROM January to September, 1921, there were 1,455 fatal coal mine accidents in the United States, a number 14 per cent lower than that for the same months of 1920. The output decreased 23 per cent, however, and the 1921 fatality rate per million tons mined is 4.01, as against a rate of 3.56 for 1920. The anthracite mines in Pennsylvania are the only group to show an increase in total fatalities for September over the same figure for 1920.

Two Ventilation Experiments

TO make a final study of adequate ventilation for the 9,000-foot Hudson tubes which have been designed to handle traffic between New York City and New Jersey is the purpose of an experimental tunnel just completed in the Bruceton mine of the United States Bureau of Mines, near Pittsburgh, Pa. The construction of this tunnel was the result of co-operation between the Bureau of Mines and the New York and New Jersey State Bridge and Tunnel Commissions. Preliminary experiments have been carried on at the physiological laboratory of Yale University and at the engineering experiment station of the University of Illinois. The Bureau of Mines has issued a report on the studies to be conducted in the experimental tunnel, which are briefly as follows: the diffusion of exhaust gases in the cross-section of the tunnel by transverse ventilation, bottom to top, and top to bottom; temperature and smoke conditions as affected by the operation of motor cars; physiological and psychological effects of temperature, exhaust gases and smoke under operating conditions; final check on all previous investigations, and practical demonstration of the solution of the problem of ventilating tunnels traversed by motor vehicles.

* * *

The gas laboratory of the Bureau of Mines Pittsburgh experiment station is working in co-operation with the research bureau of the American Society of Heating and Ventilating Engineers on the use of ozone for the ventilation of places of assembly, such as churches, schoolrooms and theaters.

Analytical work of the highest precision is required to determine whether ozone can be introduced in quantities large enough to kill bacteria without producing very serious irritation of the throat and lung tissues, and whether harmful oxides of nitrogen are not produced simultaneously with ozone.

Mine Risks, November to May

THE Chief of the West Virginia State Department of Mines has sent to mine operators and officials the following letter urging them to take extra precautions during the period from November to May to prevent accidents:

We are now entering upon the most dangerous period of the year and the records of this department show that the majority of the disasters that have occurred in this State have occurred between November and May.

To avoid disaster it is necessary to have all old abandoned sections patrolled regularly and a constant flow of air circulating throughout the working to prevent any accumulation of gas. All working places that are liberating gas should be inspected and if gas is detected, same must be removed prior to the workmen being permitted to enter. Due to the fact that the air that is going into the mine is low in moisture, some arrangements should be made at once to humidify same, or some system of sprinkling be used to prevent the mines from becoming dry and dusty. The slate along the

haulways that has been wet with moisture will become dry during the next few weeks and the danger from slate falls is much greater due to this change. All airways should be traveled regularly and same kept in proper condition to prevent any obstructions from slate falls and water. A sufficient volume of air should be maintained at all working places to insure that all gases liberated will be properly diluted and rendered harmless. The blasting of coal and slate must receive careful attention. All shots must be properly placed and tamped with non-combustible material. No overcharge should be permitted and not more than one shot fired at any one time and sufficient time should be taken between shots to insure the place having cleared of smoke and cooled off to normal mine temperature.

Another danger we may expect during the winter months and which must receive careful attention is the collecting of ice in shafts and slopes on the guides and ropes. For instance cages have been known to hang in the shaft due to this cause and men's lives have been lost from same, and to prevent accidents from this cause precautions should be taken during the extremely cold weather to prevent accumulations of this kind by inserting steam into the intake air and keep cages in constant operation. Mine officials should watch the barometer for sudden changes in the atmospheric conditions.

These are only a few of the many dangers that menace the lives of those engaged in the hazardous occupation of coal mining, but if given the attention they should have, lives will be saved and many accidents prevented.

Industrial Accidents in Pennsylvania

ON January 1, 1916, the Pennsylvania workmen's compensation law became effective. Under that law, up to September 1, 1921, compensation had been paid for 15,517 fatal industrial accidents, and for 339,586 other cases. The total number of cases reported was 1,089,353, including 515 injuries resulting in the loss of legs, 403 in the loss of arms, 1,334 in the loss of hands, 696 in the loss of feet, 3,323 in the loss of eyes, and 120 miscellaneous permanent injuries, such as broken backs.

Free Verse Used for Plant Safety

THE first-aid station of the Holt Manufacturing Company, Peoria, Ill., uses the following verse with good results in getting the men to come to the dispensary for preventive treatments:

Once upon a time,
There was a man
Who worked here.
One day he scratched his hand,
And he said:
"It doesn't amount to anything—
Things always heal up on me."
And he let it go,
And it did, that time,
And then another time,
He got a scratch
And he said:
"It's too much trouble
To go to the Dispensary;
It's all nonsense.
My blood is in good condition,
It will heal up,
All right."
But it didn't,
And that night,
His hand swelled up,
It throbbed and pained
And he couldn't sleep,
And he had blood poisoning,
And pretty near lost
His hand and arm,
And was laid up
A couple of months,
And couldn't pay the rent
Or anything,
And when he got well,
Some fingers were crooked
And stiff and always will be.
When he went back
To work,
He said:
"After this
You bet,
I am going to
BEAT IT!
To the Dispensary
At once—if ever I get a cut or scratch."
And will you do the same?

(Contributed to SAFETY ENGINEERING *by Dr. Sumner Miller.)*

Rotary Clubs Health Week

THE week beginning December 4 will be observed as Public Health Week for all Rotary Clubs, in accordance with a resolution adopted in convention directing the designation each year of a week to be devoted to the promotion of physical fitness.

A. S. E. of Western Washington

THE latest local organization of safety engineers is the Associated Safety Engineers of Western Washington, formed after two meetings at Sedro-Woolley and Everett. The officers are Clarence Parker, president, T. H. Boyd, vice-president, and John Shaughnessey, secretary-treasurer. Cities represented at the initial meetings include Seattle, Bellingham, Tacoma, Skagit and Everett.

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

G. E. Sanford, Pres. C. Van Horn, Treas.
Vice-Presidents: Geo. Oliver Smith and Eckford DeKay

DIRECTORS:

Thos. A. Walsh, Merchants' Shipbldg. Corp. — A. D. Risteen, Travellers' Ins. Co. — W. J. Venning, Ætna Life Ins. Co.
Frank Scott, Hamlin & Co. — Holger Jensen, Maryland Casualty Co. — Geo. B. Muldaur, Underwriters' Laboratories
M. G. Lloyd, U. S. Bureau of Standards — Geo. T. Fonda, Bethlehem Steel Co. — W. E. Welch, Travelers Insurance Co.
Albert S. Regula, Liberty Mutual Ins. Co. — Rowland H. Leveridge, N. J. Dept. of Labor — J. Albert Robinson, Grinnell Co.

Regular Meetings—Fourth Friday of Each Month from September to June at 8 P. M.

NOVEMBER MEETING

SUBJECT: Safety Work in the Rubber Industry.

Time: November 25, 8 p. m.

Speakers: William H. Larkin, Jr., Power and Safety Engineer, United States Rubber Company; H. S. Poole, Safety Engineer, Canadian Consolidated Rubber Company; Frank Scott, Safety Engineer, Hamlin & Company.

Place: Engineering Societies Building.

DIRECTORS' MEETING

THE regular monthly meeting of the Directors of the American Society of Safety Engineers was held at the United Engineering Societies Building, 29 West 39th street, New York City, on Friday, October 28, 1921.

The meeting was called to order at 3.30 p. m. by G. E. Sanford, president. There were also present, E. C. DeKay, vice-president; C. Van Horn, treasurer; W. E. Welch and F. Scott, directors, and F. P. Porter.

MEMBERSHIP DEVELOPMENT COMMITTEE

W. E. Welch reported that letters had been prepared and sent to 250 carefully selected prospects, and that another letter was being prepared to be sent to 300 presidents and other officials of various casualty companies; these letters to be followed by another series if not answered within a reasonable period.

President Sanford reported that he had had a conference with Mr. Rice and Mr. Hartford of the American Society of Mechanical Engineers, and that Mr. Hartford had agreed to give all necessary overtime to building up the American Society of Safety Engineers in a manner similar to that in which he built up the Society of Automotive Engineers.

COMMITTEE ON SECTIONS

President Sanford reported that on Tuesday, September 7, a meeting of 35 to 40 members of the society in the vicinity of Boston was held at the Hotel Victoria, and that everybody was greatly interested in the formation of a Boston Section of the Society. Dr. Lloyd, Dr. Chaney and Dr. Risteen were present and spoke to the meeting on the subject, and Mr. Sanford expressed his belief that the Boston Section would eventually develop. Dr. George Opp, of the Detroit Edison Company, advised the president that he was desirous of forming a Section of the American Society of Safety Engineers in Detroit, and requested booklets for local distribution with that idea in view. Mr. Welch stated that the books had been sent to him.

COMMITTEE ON CODES

Paper and Pulp Code: Mr. Sanford reported that sponsorship for this code had been granted to the National Safety Council nearly two years ago; that we had appointed a representative on the code over a year ago; but that nothing had as yet been done by the National Safety Council in connection therewith.

The Secretary was directed to write to the National Safety Council and inquire what was being done or contemplated in connection with this code.

Lightning Protection Code: This code is being developed by the Bureau of Standards and the American Society of Electrical Engineers jointly, President Sanford having appointed E. R. Scales of the Edison Lamp Works, Harrison, N. J., to represent the American Society of Safety Engineers in connection therewith.

Logging and Saw Mill Machinery Code: President Sanford reported that he attended the last meeting of the Sectional Committee of the United States Bureau of Standards held in Boston, in place of C. O. Hero. He reported that the code was progressing favorably.

Protection of Heads and Eyes of Industrial Workers Code: This code was sponsored by the Bureau of Standards and the code promulgated about a year ago. People interested immediately suggested a number of changes, and a new committee was appointed to consider changes. Further tests are being made by the Bureau of Standards, which, as soon as completed, will be reported back to the Sectional Committee.

Compressed Air Machinery Code: President Sanford reported that he had received a letter from Dr. A. S. McAllister of the American Engineering Standards Committee, advising him that the American Society of Safety Engineers had been given full sponsorship for the above code. Dr. McAllister also stated that the American Society of Mechanical Engineers had requested designation as joint sponsors of this code. It was therefore resolved to accept the sponsorship and to advise Dr. McAllister that the society would acquiesce in the request for joint sponsorship by the American Society of Mechanical Engineers. Attention was also invited to the fact that this code should not be confined to "Compressed Air Machinery," but should cover all compressed air operations, as "Compressed Air Machinery" would limit the code to air compressing machinery and transmission lines alone.

Dust and Fumes Code: The American Engineering Standards Committee reported that their main committee had voted to include this work in the Ventilating Code, for which the American Society of Heating and Ventilating Engineers is sponsor, and that, therefore, our application for joint sponsorship could not be approved, but we were invited to co-operate in formulating rules for the Section on the removal of dust and fumes in factory work.

EDUCATIONAL COMMITTEE

J. Albert Robinson, chairman, submitted the suggestion that the Society get out a text-book on Safety Engineering, and wished to send a questionnaire to the members with a view to determining who could best prepare various portions of such a book. It was decided that this could best be done by inserting a notice in SAFETY ENGINEERING on the subject.

SPECIAL COMMITTEE

The Special Committee, consisting of G. O. Smith, E. C. DeKay, H. W. Mowery, C. Van Horn and W. E. Welch, reported that they met on Monday, October 10, to consider affairs of the Society.

Affiliation with the American Society of Mechanical Engineers was discussed, and letters read from Ernest Hartford, assistant secretary of that society, in charge of Local Sections. The correspondence was referred to Mr. DeKay for action.

MEMBERSHIP COMMITTEE

W. E. Crippen submitted the following applications for membership, which had been approved by the Membership Committee. The applicants were unanimously elected by the directors, as follows: Thomas Henry Day, Electrical Engineer, New England Insurance Exchange—Member; Edgar G. Quesnel, Safety Engineer, Barber Asphalt Company, St. Louis, Mo.—Member; James A. Roe, Jr., Manager Rating Department, and in charge of Safety and Welfare Work of the Indemnity Insurance Company of North America—advanced from Junior to Member; H. Weaver Mowery, American Abrasive Metals Company—advanced from Associate to Member.

The meeting adjourned at 5.30 p. m.

Harrisburg Industrial Conference

THE Department of Labor and Industry of the State of Pennsylvania planned carefully its Industrial Relations Conference, held in Harrisburg, October 24-27, and it proceeded according to schedule.

A few absentees, such as Secretary Hoover and Governor Sproul, did not seriously mar the real business of the conference. There were no pyrotechnics. Nothing happened of a sensational character. Everyone seemed bent on trying to accomplish something.

INCIDENTS OF THE SAFETY EXHIBITION

Among the exhibitors at the Penn-Harris hotel were three moving picture companies: The Ad-Photo-Scope Company, 424 Market street, Philadelphia; the Graphoscope Service Company, 933 Liberty avenue, Pittsburgh, Pa., and the United Projector and Film Company of Buffalo. They showed safe and sane pictures of interest to persons possessing the faculty of reflection.

Perhaps, if it had not been for Colonel Thomas of the Julius King Optical Company, who had a booth right beside that of H. Weaver Mowery, of the American Abrasive Metals Company, life might not have been so interesting for the exhibitors at the Penn-Harris. For they were constantly on the job, as the visitors approached, and even George Oliver Smith of the American Atmos Corporation was seen to unbend a little and really unmask as he conversed with his rival (in business only) Miss Rossito of the Protective Safety Appliance Corporation of Newark, N. J.

If Mr. Peele, of Brooklyn, and Mrs. Peele did not know as much about the fox trot as safety doors, life would not have been so full of zest at the Wednesday evening dance tendered the exhibitors by the employes of the Department of Labor. And one should not fail to mention the earnest efforts of Mr. Fischer, of the Central Brass Manufacturing Company of Cleveland, who not only supplied flowing pure water in his booth at the Penn-Harris, but came to the dance like a 14-year-old, full of the joy of life, making the cup of joy to run over with his high spirits.

The only unkind thing that happened was when (it is reported) Buell W. Nutt "sez" that Rockwell of Willson Goggles was wearing a pair of Julius King's, and when Col. Thomas, of the *vice-versa* company, accidentally broke his *pince-nez*, which an expert stated was made by a Reading industrial institution. Apologies were given and accepted, it is stated, and no blood was shed.

THE COMPLETE LIST OF EXHIBITORS:

Ad-Photo-Scope Company, 424 Market street, Philadelphia, Pa. Ad-Photo-Scope motion picture machine.

Aero Alarm Company, 26 Cortlandt street, New York City. Automatic fire alarm system. Manual fire alarm system.

Allis-Chalmers Manufacturing Company, Inc., 50 Church street, New York City; Milwaukee, Wisconsin. Dust collectors and dust collecting systems.

American Abrasive Metals Company, 50 Church street, New York City; Boston, Chicago, Philadelphia, Pittsburgh. "Feralun," "Bronzalun," "Vulcalun" anti-slip stair treads, floor plates, door saddles, trench covers, safety treads.

American Atmos Corporation, 105 West 40th street, New York City; Pittsburgh, St. Louis, San Francisco. Pulmotors and oxygen inhalation devices, mine rescue apparatus, fire department oxygen helmets, self-contained oxygen breathing apparatus.

The Central Brass Manufacturing Company, Cleveland, Ohio. Drinking fountains and faucets.

Gardner Grate Company, 21 Burgess street, Boston, Mass. "I-Gards" for water gauge glasses. Finger "Gards" for power sewing machines.

Graphoscope Service Company, 933 Liberty avenue, Pittsburgh, Pa. Graphoscope Junior motion picture machine.

Julius King Optical Company, 12 Maiden Lane, New York City; Pittsburgh, Chicago. Goggles and heat protection masks.

Lungmotor Company, 711 Boylston street, Boston, Mass. Lungmotor, a resusciating device for use in cases of gas, smoke or fume asphyxiation, electric shock, apparent drowning, collapse during anesthesia, a strangulation or any case of suspended respiration.

McNutt Non-Explosive Cans, 83 Chambers street, New York City. Safety devices for volatile liquids, gasoline safety cans.

Mine Safety Appliances Company, 908 Chamber of Commerce Building, Pittsburgh, Pa.; Philadelphia, Pa. Electric safety lamps and equipment, oxygen breathing apparatus

and rescue station equipment, first aid supplies, cabinets, stretchers, precision instruments, gas detectors, signs, bulletin boards, charts, goggles, respirators, Autex reels, gas masks.

Norwich Wire Works, Inc., Norwich, N. Y. Guards for machinery.

The Peelle Company, Brooklyn, New York. Automatic elevator doors, safety appliances for elevators and elevator doors.

Protecto Safety Appliance Company, 50 Columbia street, Newark, N. J. Masks for use in industrial gases, respirators, electric hand lanterns.

The Prudential Insurance Co. of America, Newark, N. J. Graphic charts on accidents, life conservation and protection.

Pyrene Manufacturing Company, Inc., 17 East 49th street, New York City. Hand fire fighting equipment and safety devices.

SAFETY ENGINEERING, 126 Maiden Lane, New York City. The Magazine of Safety.

The Safety Equipment Service Company, Buell W. Nutt, president, Cleveland, Ohio. General safety equipment.

Safety First Supply Company, 107 Third avenue, Pittsburgh, Pa. Safety appliances and first aid equipment.

Square D Company, Detroit, Mich.; New York City. Square D externally operated electrical safety switches.

Standard Safety Equipment Company, 168 North Michigan avenue, Chicago, Ill.; Newark, N. J.; Detroit, Mich. Linemen's safety belts, safety carboy carrier, all kinds of protection goggles, welding goggles, danger and safety signs, porcelain enamel, first-aid case, asbestos gloves and leggings, leather gloves and leggings, acid aprons, linemen's blankets, electricians' gloves, respirators, sand blast helmet. acid hood, welding equipment consisting of torches and regulators.

W. H. Sylvester & Son, 3627 Smedley street, Philadelphia, Pa. Sylvester safety devices for job printing presses.

Trumbull Electric Manufacturing Company, Plainville, Conn. Safety switches and panels.

United Projector and Film Company, Buffalo, Pittsburgh, Harrisburg, Albany, Toledo. Victor Safety Cinema, Spencer Delineascope, industrial and educational films.

Willson Goggles, Inc., Reading, Pa. Willson welding goggles, Willson safety goggles and the new LJ31½ safety goggle, "Dustite" respirator.

Valuing the Human Costs of Fire

"THE most lamentable item in reviewing the terrible destruction occasioned by fire," declared James F. Joseph, of the Chicago Conservation Commission, speaking before the Chicago Safety Council, "is the annual killing of 15,000 persons.

"Let us," he said, "assess a nominal judicial value of $5,000 against each life and we have $75,000,000. Again, approximately 18,000 people are injured as a direct result of fire—another unknown financial quantity, but we believe we are well within the bounds of reason in nominating $2,500 as the final figure against each injury, and we have a figure of $45,000,000.

TWO-THIRDS OF ALL FIRE FATALITIES ARE WOMEN AND CHILDREN IN HOMES

"When we stop to realize that the 15,000 we kill annually, largely through carelessness, is approximately 50 per cent of the members of the American Expeditionary Force that were killed in service during a period of 12 months, is it not an indictment that we should immediately recognize and take prompt steps to avoid?

"It seems more regrettable when we know that of this 15,000 that are annually killed, 70 per cent of that number are women and children, and the majority of the children are of the school age and below the school age, meaning that the fires in the homes, schools and hospitals produce the majority of these deaths. That is readily understood when we know from the grim record that two-thirds of all the fires in the United States occur in homes—that five school houses are on fire each day in the year, and that one hospital out of every 11 has a fire.

"On the other hand, apparently the materialistic side of our life is better looked after. The record shows that there is only one fire in every 200 mercantile establishments, clearly indicating that the individual pays more attention to protecting his business house, his employes and customers than he does to his family, the school children and the helpless in our hospitals."

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 477 FOREMEN'S RESPONSIBILITY INTENSIFIED.—Our general conception of a foreman is a man chosen for his knowledge of the machines and processes in his department, for his ability to handle men and secure the largest possible output at the lowest possible cost.

For the most part this is true, but there is one glowing exception—an exception which augments the severest machine hazard in American industry, the metal-stamping trades, the losses from which are appalling. Nine out of ten punch-press foreman do not measure up to any one of the above requirements. We always find the poorest foreman in the plant in charge of the punch-press department, the most dangerous place in the entire plant.

The reasons we find the young, inexperienced, know-it-all, weak-sister foreman in a place of such responsibility are obvious. He does not have to be a driver or a leader. Because the work is on a piece-work basis and the machines are quick in action, pushing for production is not so important as in other departments. There are no fine requirements, no expert workmanship to supervise. The class of labor employed on presses, generally young inexperienced girls, is easy to handle. The foreman is selected because his previous experience as a die maker makes him a good inspector of the work turned out.

To prove my assertion let me give two examples drawn from actual recent experience. One is positive, showing what a real foreman can accomplish; the other is negative, showing what a young and inexperienced foreman can do in cutting off young women's fingers. Both plants make the same product.

In the first plant, operating about 30 presses, half of which carry dangerous operations, all operators are on a piece-work basis and *not a single press is guarded.* They have had but one punch-press amputation case in two years and that one a "suicide," a Polish laborer deliberately sacrificing two fingers in order to obtain passage money to Poland, there to join his wife and family—perhaps incidentally to point to his disfigurement as one of his scars of war (?). Good supervision accounts for this wonderfully good record. The superintendent of the plant is really the foreman of the press department. He does four things absolutely essential to safe operation under such unsafe conditions as piece-work operations and unguarded presses: (1) He *supervises* the work of the toolroom, insisting that safety dies be made whenever possible. (2) He supervises the employment of press operators, insisting that they be a stolid type of middle-aged Polish laborer. (3) He keeps the presses in perfect working order; all complaints from the operators receive immediate attention or the work is transferred to a *spare press* until the press under suspicion can be taken down, and the latch, springs and vital parts of clutch mechanism can be thoroughly examined and replaced. (4) He breaks in or teaches the new employe

himself, and insists on the punch-press foreman following up such instructions by intensive watchfulness, at all times correcting any wrong practice and enforcing the rules. The foreman is the one discharged if a preventable accident occurs, not the workman. He gives all these points consideration and attention above every other demand. The management of the industry have become converted to the advisability of such a course.

The other plant has 12 presses *all guarded* with a latchlock type of guard at point of operation. They had six punch-press amputation cases in July, and started August with two on the first day of the month. This unfavorable experience cost $4,500 for fingers, to say nothing of incidental losses of time and production.

The reason? Lack of proper and *adequate supervision.* Guards are of no value when removed from the machine. Presses with defective, worn-out latches are apt to "repeat," and young inexperienced girls and boys easily become inattentive to their work by reason of mental fatigue. All of these conditions the foreman should correct.

Do not these extreme examples show that punch-press foremen are, above all other shop foremen, responsible for industrial accidents? Factory executives should recognize these facts, pay a large enough salary to secure a good man, insist on his running a safe department, or replace him, thereby stopping a leak in the company's finances many times greater than the increase in the foreman's salary.

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No. 478 ARE YOUR STATISTICS WORTH ANYTHING?—A safety engineer can have as much "lost motion" in his department as any other department and yet not know it. Some will say this is not so, but I have been "through the mill." I wish to offer for discussion the following four questions which arise in my mind:

(1) What is causing the accidents?

(2) What class of injuries are being received by the workmen?

(3) What part of the workman's body receives the most injuries?

(4) How shall I keep statistics to answer the above questions without a lot of extra work?

The following form was the outcome of my own effort to answer them:

	Hernias	Miscellaneous	Dislocations	Infections	Burns	Sprains	Lacerations	Contusions	Punctures	Incised
Material handled by self										
Material handled by fellow workman										
Tools handled by self										
Tools handled by fellow workman										
Equipment handled by self										
Equipment handled by fellow workman										
Defective material										
Defective equipment										
Defective construction										
Falling objects										
Falls, poor working conditions										
Falls										
Safety devices, Non-use of										
Safety devices, lack of										
Poor housekeeping										
Nails										
Splinters										
Elements of nature										
Unknown										

The space in the upper left corner of the form is used for the following headings, making one sheet for each:

Head	Hands, right
Eyes	Legs, left
Arms, left	Legs, right.
Arms, right	Feet, left
Hands, left	Feet, right

Trunk

Each day as the accidents are reported, the accidents are investigated, first through the foreman or eye witnesses. The reason for this is so that the investigator may be able to talk intelligently to the injured and allow the injured time to collect himself, as he has naturally become confused.

Next, the injured is questioned, then his story, the story of the foreman and eye witnesses are all weighed together and a conclusion reached as to the cause.

We next find out the result from the first aid station or doctor, and then mark

up the finding on the proper form in the proper place. For example, John Jones cut his left hand with a chisel. Under "Hands, left," "Tools handled by self," "Incised," we put a mark, and so on for each case. At the end of the week, we take off a recapitulation on the same form in the same way as we keep the day record. At the end of the month, the same thing is done, so that at any time, we can easily make up a recapitulation for any given period.

The following statistics are the outcome of this system on a construction project that required the service of around 3,500 workmen of all crafts:

MAY 1 TO OCTOBER 31, 1919 (6 MONTHS)

Injuries received (*not* accidents)	1,322.00
Injuries per thousand men per year	12.36
Causes:	
Under control of insured	65%
Caused by elements of nature	5%
Caused by fellow workmen	15%
Miscellaneous causes	15%
Parts injured:	
Head	10%
Arms	5%
Hands	56%
Trunk	8%
Legs	12%
Feet	9%
Class of workmen:	
Skilled labor	35%
(Carpenters comprised 75% of above 35%)	
Unskilled labor	65%

NOVEMBER 1, 1919, TO JANUARY 31, 1920 (3 MONTHS)

Injuries received (*not* accidents)	194.00
Injuries per thousand men per year	4.66
Causes:	
Under control of injured	62%
Caused by elements of nature	3%
Caused by fellow workmen	20%
Miscellaneous causes	15%
Parts injured:	
Head	9%
Arms	3%
Hands	49%
Trunk	9%
Legs	18%
Feet	12%
Class of workmen:	
Skilled labor	40%
(Carpenters comprised 65% of above 40%)	
Unskilled labor	60%

As you will note in the statistics for the first six months under "Causes," 65 per cent of the injuries happened under control of injured. Under "Parts injured," the hands received 56 per cent of the injuries. Under "Class of workmen," carpenters and unskilled labor received most of the injuries. This gave me something to work on so that I was able to concentrate my efforts where they were most needed. As you will note in the statistics for the three months following the first six months after the system was put into effect, the injuries received were reduced about 70 per cent.

Prizes for October Articles

First Prize No. 475. A. M. Underhill, Safety Engineer, S. F. Bowser & Company, Inc., Fort Wayne, Indiana.

Second Prize No. 476. Albion M. Soulé, Jr., 7 Arlington Terrace, Malden, Massachusetts.

Comments by Members of the October Committee

I suggest that first prize be awarded to Article 475 for two reasons:

1. Because the writer emphasizes the need for a continuous safety organization. It takes time to build up a safety council in any manufacturing plant and to instil firmly, in the minds of the employes, individual responsibility and in-

terest in the prevention of accidents. Keep the safety engineer always on the job. It is cheaper in the end.

2. He strongly advocates safe flooring and includes passage ways, aisles and elevated runways. He is specific as to kinds of flooring, methods of maintaining aisles in unobstructed condition, and as to maintaining handrails on elevated runways and stairways in safe and legal condition.

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I wish to thank SAFETY ENGINEERING for the opportunity extended of serving on its committee to award prizes for The Man On The Job articles. I am a machinist, having worked at that trade for 15 years. When I began, little or no thought was given to the safety question.

The most convincing argument that can be brought to the notice of any manager or superintendent of an industrial plant of the value of safety work is a compilation of figures for his own establishment showing reduction of time loss through accident prevention measures. Such time loss means financial loss, as every manager in charge of an industrial plant knows very well.

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Emphasis should be given at all times to the fact that accident causes common to most industries produce a very large number of accidents in particular industries. Therefore, I think article 475 should have the October prize.

Exhibit of Safety Bulletins in Amsterdam

FAMILIAR safety signs met the eyes of all Americans who visited the exhibit of safety bulletins in the Dutch Safety Museum during recent months. The illustration shown below was received by SAFETY ENGINEERING from R. A. Gorter, M. E., Director of the Museum, with his acknowledgement of the co-operation received from American manufacturers through his request published in this magazine last May. The address of the museum is Veiligheidsmuseum, Hobbemastraat 22, Amsterdam, Holland.

Poster exhibit room of Dutch Safety Museum, showing American safety signs on display.

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

COAL AND LUMBER YARDS

August 3, 1920. Eau Claire, Wis. John H. Kaiser Lumber Company, 10th avenue and Menominee street. Lumber yards. One 1-story building destroyed. Walls, wood. Floors, wood. Roof, wood deck, metal covering. Cause, undetermined, probably hot box. Fire started in interior. Discovered by watchman at about 9.50 p. m. Alarm, city fire alarm. Duration, 6 hours. Confined to planing mill. Fire was favored by construction of building, and by headway before discovery, but retarded from spreading by direction of wind. Private fire apparatus, local pumps, which proved a large factor in boosting water pressure. Persons in building, none. Value of building and contents, $80,000. Property loss, $80,000.

August 14, 1920. Wilkinsburg, Pa. Otterman Brothers' Lumber Yard, 1129 Pitt street. Hardwood workshop. One 1-story building damaged. Walls, frame. Floors, frame. Roof, tar paper. Cause, undetermined. Discovered by citizens passing building at about 7 p. m. Alarm, public alarm system. Duration, 30 minutes. Stopped at building of origin. Private fire apparatus, none. Persons in building, none. Value of building and contents, $20,000. Property loss, $9,500.

August 21, 1920. Scranton, Pa. Scranton Coal Company, Briggs street near D., L. & W. Railroad. Briggs breaker engine and fan houses. Three 1-story (110-ft.) buildings damaged. Walls, wood. Floors, wood. Roofs, wood and slag. Cause, overheated journal. Fire started in fan house. Discovered by fireman in a station about 3 blocks away, at about 6.18 a. m. Alarm, Gamewell system. Duration, about 7 hours. Stopped when breaker burned down. Fire was favored by oily building and timber old and dry. Private fire apparatus, none. Killed, none. Injured, 1 (fireman). Means of escape, stairways. Value of building and contents, $150,000. Property loss, $115,000.

August 22, 1920. Newcastle, N. B. Edward Sinclair Lumber Company, Kings Highway. Five 1½-story buildings damaged. Walls, wood. Floors, wood. Roofs, wood. Cause, spark from burner near lumber piles. Fire started under lumber pile. Discovered by mill workman at about 1 p. m. Alarm, telephone. Duration, 74 hours. Stopped at mill after catching other buildings across street. Fire was favored by wooden construction. Firemen handicapped by lack of proper pumps. Value of building and contents, about $200,000. Property loss, not reported to SAFETY ENGINEERING.

September 3, 1920. Indianapolis, Ind. Capitol Lumber Company, 49th street and Monon R. R. Lumber yard and mill; 3 dwellings; 1 cement block factory. Four 1-story buildings damaged. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in mill. Discovered by passerby at about 9.37 p. m. Alarm, telephone. Duration, over 14 hours. Buildings consumed. Fire was favored by wooden construction. Firemen handicapped by lack of water. Private fire apparatus, none. Persons in building, none. Means of escape, doors and windows. Value of mill building and contents, $45,000; others not reported. Property loss on mill building, $38,000; others, $7,650.

September 7, 1920. Poultney, Vt. Ripley Lumber Company, Church street. Sash, blind and lumber mill. One 2-story building destroyed. Walls, wood. Floors, wood with slate covering. Cause, backfire of boiler into pile of shavings. Fire started in boiler room. Discovered by fireman in engine room at about 12.50 p. m. Alarm, Gamewell system. Duration, about 5 hours. Private fire apparatus, none. Persons in building, 2. Killed, none. Injured, 1. Means of escape, none. Palue of building and contents, about $75,000. Property loss, about $75,000.

September 29, 1920. Waterloo, Ia. William Galloway's Lumber Yard, Westfield avenue. Manufacturing farm machinery. One 1-story building destroyed. Walls, wood. Floors, wood. Roof, wood. Cause, unknown. Fire started in lumber shed. Discovered by workmen at about 3.50 p. m. Alarm, telephone. Duration, 4 hours. Stopped at lumber shed. Fire was favored by wooden construction of building. Firemen handicapped by high wind. Private fire apparatus, 6 lines of hose. Persons in building, none. Means of escape, doors. Value of building and contents, $901,856. Property loss, $33,086.

Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

AN ELECTRIC CONTROL BOARD

The Fire Alarm and Watchman's Control Board illustrated below is installed in the plant of the Kelly-Springfield Tire Company, Cumberland, Md. The new buildings of this company cover 12 acres, and there are 22 acres of floor space. The material required for this modern factory was enough to make a train 50 miles long. It is said to be the most efficiently equipped tire factory in the world. The board shown here is 9 ft. 8 in. long, 6 ft. 2 in. high, and is the heart of the complete Fire and Watchman's System, which safeguards the factory 24 hours of the day. When a fire-box is pulled in any part of the building, a huge electrically operated steam whistle which can be heard all over the valley, is automatically sounded.

Holtzer-Cabot Control Board

Should it be found necessary to clear any floor in any part of any building, this is accomplished by signal bells which are operated from the control board. Signals for fire drills or for starting and stopping work in the whole or certain parts of the factory may also be given from the board.

A unique feature of this control board, which is perhaps the largest yet built, is the watchman's signals. As the several watchmen go from station to station, the head watchman at the desk can observe their progress by the proper sequence of the lamp signals (see center of board).

Even if the head watchman is inclined to overlook the missing of a station here and there, he cannot get away from the dial record which is kept under lock and key in the clock cabinet. This watchman's clock stands 8 ft. 6 in. high. Only the general manager or some other high executive has the key to the clock cabinet, and the records made on the dial sheet therein are final. This control board, including wiring, circuits, fire and watchman's boxes and stations, was designed and manufactured by the Holtzer-Cabot Electric Company of Boston.

THE SIREN AS A FIRE ALARM

The demand in small communities for a distinct and unmistakable warning signal for use in case of fire or disaster has brought about the development of powerful electric sirens as fire alarms.

Under the regime of bells, whistles and steel rims considerable confusion sometimes existed when these alarm signals were mistaken for locomotive bells and whistles, and other common sounds. Factory whistles were sometimes used as a signal of fire, but these were particularly confusing and easily mistaken as they were blown daily to indicate to the factory employes the starting of work, lunch periods, and the closing of the plant. In a great many cases, these factory whistles have been discontinued because of the fact that steam is being supplanted by electrical current more and more each day.

When these old methods were used fire department volunteers, scattered around various parts of the town and working in the fields, often failed to respond in full strength, due to the misinterpretation of the signal, and fires have gained great headway before sufficient help could be summoned.

One of the most widely used fire department electric sirens is the "Sterling," sold exclusively under new arrangement by the American LaFrance Fire Engine Co., Inc., of Elmira, New York. Many of these have now been installed in the smaller towns throughout the country.

Once heard, the "note" of the Sterling Electric Siren can never be forgotten. Its blast begins with a deep moaning sound which gradually increases in pitch until its highest note produces a shrill shriek. The electrical contact is then broken and the siren is allowed to de-

scend the scale. This operation is repeated over and over again until the main contact is finally broken by the operator.

The Sterling Siren is made in two sizes, single and double head. The double head siren is really two sirens built in one and possesses approximately twice the volume of sound produced by the single head. The note of the single head siren may be heard up to a distance of 1½ miles, whereas the double head sent its warning over an area of 2 to 2½ miles. Under favorable wind conditions the carrying power of both of these types may be somewhat increased.

MARYLAND CASUALTY HOUSE-WARMING

The home office of the Maryland Casualty Company, Baltimore, Md., held a Housewarming Celebration September 27 and 28, at which agents and managers were entertained by the Board of Directors, officers and staff. Outdoor sports were the order of the day, and the company had its new clubhouse open for a banquet, following the steamboat excursion down Chesapeake Bay to Annapolis.

"WASHING THE AIR"

Proper disinfecting of industrial plants is coming more and more to interest the safety engineer and personnel executive.

Every time an employe loses a few days from his work there is an increase in overhead more or less theoretical, depending on how easily replaced the particular employe may be.

And it is just as easy for the principal executive of a plant to become ill through unsanitary conditions, as for the cheapest typist.

It becomes a matter of dollars and cents, and people interested from a purely commercial aspect in making their business pay dividends are not slow to realize the value of the proper use of disinfectant.

Germs cannot be seen and attacked, neither can they be caught and imprisoned by any contrivance. We must rely solely on the efficiency of the application of the disinfectant.

Leaving the matter to soap and water and elbow-grease, the effectiveness of this method cannot be denied, but this must be left to some very menial employe who may or may not be conscientious in his work.

The Allen-Robinson Company of Toronto, with offices in New York at 51 East 42d street, are marketing what they term "EX-ODOR" which is used in a sprayer giving off a fine vapor spray that they claim "washes the air" and permeates everywhere, being thus entirely different from compounds applied merely locally.

They claim it is not only a deodorant but also a germicide of sufficient power to render places in which it is used thoroughly clean and free from germs. The bacteria, as well as the odor, are arrested at their source. It is said to be harmless when used on carpets or linens, despite its power, and not injurious in any way to the person operating the spray.

NEW LIMIT SWITCH FOR SAFE CRANE OPERATION

A new crane safety limit switch has been put on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. This switch is designed to eliminate the undesirable features generally connected with the operation of a crane or hoist installation, when the hoist brake overtravels, resulting in the loss of production and often the injury of workmen due to broken cables, blocks and drums. The normal operating range of the hoist is increased as it permits the handling of a greater amount of material, since there is no necessity of losing time by approaching the limit of travel slowly and cautiously. The safety limit guards the equipment, irrespective of the kind of control or the position of the controller handle or brakes.

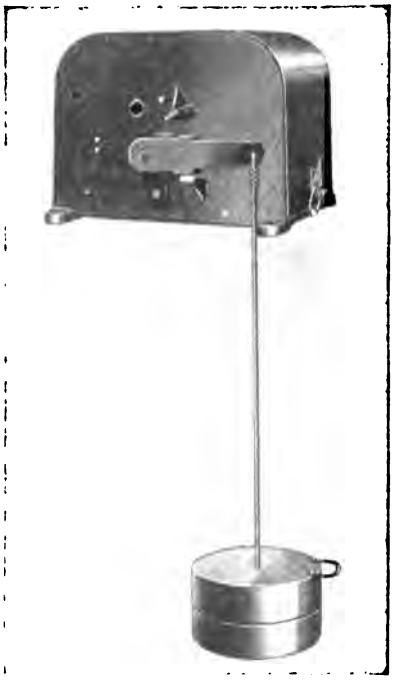

Fig. 1. Limit switch held in operating position by means of counterweight.

Under normal operating conditions of the machine, the limit switch is held in the operating position by the counter-weight as shown in Fig. 1, which overpowers the torsion operating springs. In case of overtravel, the counter-weight is raised by the hoisting hook or other moving part, which permits the strong

torsion spring which may be noted in Fig. 2, to operate the switch. This disconnects the motor from the line and establishes a closed dynamic braking circuit through the motor armature, motor series field and resistor, which stops the motor, irrespective of the position or type of the controller or brake. The operation of the switch also releases the series magnetic brake which holds the load until the controller handle is moved to the lowering position. As soon as the hook has been lowered beyond the limit, the switch is again ready to function as before, as it resets itself, automatically. The quick-make and quick-break feature of the switch throws it rapidly from the normal to the braking position when approaching the limit and back to the normal operating position when backing out. It will not remain in a partially open or partially closed position and destroy the contacts or fail to function.

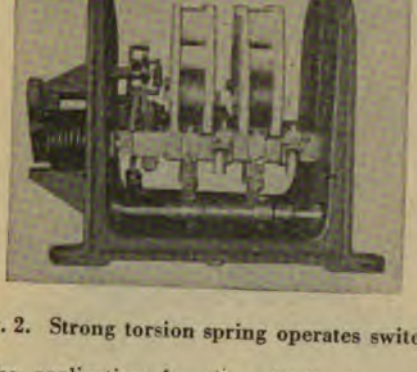

Fig. 2. Strong torsion spring operates switch.

The application for these limits is mainly for controlling the travel of the moving parts of the hoisting machine. However, they may be used on metal mixers, bridges and other applications employing series motors, where it is desired to limit the travel in one direction by applying dynamic braking.

ELECTRICAL MACHINERY INSURANCE

The Travelers Indemnity Company announces that it is to undertake the insurance of electrical machinery.

The present extensive use of electricity and its future development indicate that the insurance of electrical machinery will be a line of no small consequence.

Accidental damage to this type of machinery from mechanical defects, as well as from electrical disturbances, including lightning, is not rare. The uncertainty surrounding the subject of electricity forms a background for accidents which permit of no adequate explanation. There has not before been available to the operator of electrical equipment any relief except the way of insurance to pay for these sudden and unexpected occurrences.

SUPER-SAFETY ELECTRIC SWITCH

An electric switch of a decidedly unique design is being manufactured by the Super-Safety Electric Company, 5021 South State street, Chicago.

The base member is of insulating material and has semi-circular depressions, one for each pole. These depressions are adapted to receive the line and load contact members. The sides of this base member are adapted to receive a rigid rectangular operating shaft transaxially through the same. This shaft passes through fuse holding members of insulating material. Mounted upon these insulating pieces are fuse clips and conducting members forming an integer with same; this integer is operated by a handle on the extended shaft. The turning of the shaft brings the fuses and contact clips in and out of register with the line and load contacts in the bottom of the base member as described above.

To conceal all live members in the base an insulating cover with oblong holes punched therein is placed upon the base member and removably fastened by means of wingnuts, the oblong holes being so designed as to facilitate the turning of the fuse holding members in the same, these said holders and clips thereon being used as a switch in the same manner as a switch blade in the old style switch.

This plate or cover is also equipped with holes punched directly over each line and load member in the base beneath, so as to facilitate the testing of the fuses and the line; it is claimed that this is the only switch in which this is possible that has a safety rating.

For motor starting a fuse-shunting device is furnished which is integral with the fuse-holding member. This provides a means by which the heavy initial current of starting motors is taken off the fuses until the motor is drawing normal current, thus saving the fuses from overload. This device does not however shunt the fuses while the switch is being thrown into the "off" position.

All the mechanism of this switch is mounted on a metal cradle which, with the door, can be removed from the bottom of the box, so that conduits and wires can be installed without the interference of the switch mechanism. The switch proper can then be readily replaced and connected in.

The door locks automatically and in the open position the switch is not operable; hence there is no necessity for padlocking the door.

An unrestricted view of the operation of the switch may be obtained through a glass in the door.

All contacts and other members are readily removable from the front without the necessity of dismounting the entire device, and are as readily replaceable.

The design of the switch is centered toward one main object, and that is the complete security of all persons, whether expert or inexpert. But at the same time, economy of operation and also convenience have been admirably taken care of.

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Where Fire Dangers Are Inconsistent

IN the first eight months of 1921, Safety Engineering's fire records show 93 fires in schools and colleges—about one fire every two and a half days, which was also about the average in 1920. Such fires, reaching sometimes disastrous proportions, have been the subject of frequent comments and warnings in this and other magazines.

At this time, when the nationally organized groups interested in the advancement of all phases of safety work have endorsed a widespread educational program to teach safety in the curriculum of every elementary school, it is an important and pressing necessity that school and college buildings should be made resistant to fire. They serve as horrible examples for instruction in the principles so widely advocated to be taught within their walls when those walls are of unsafe construction.

Photograph from Underwood & Underwood, N. Y.

A fire involving $200,000 property loss at St. Stanislaus College, near Macon, Georgia. This college was founded in 1870 as Pio Nono, and has prepared many candidates for Jesuit priesthood. The College Library contained several fifteenth century imprints. Fire completely destroyed the college on November 14, 1921

A Man's Cash Value to Society

THE value of a life is a question which can never be settled to universal satisfaction, but which frequently has to be answered at least assumptively for the purposes of estimating various costs. The field of safety work presents many opportunities for estimating, for everyday use, the average cost to society when a life is snuffed out by a preventable accident, or when a producing unit in a great plant is made unproductive by serious injury.

Whenever SAFETY ENGINEERING publishes an article which uses incidentally one of the various averages offered for diverse assumed conditions, there is always apt to be a demand for "the data," and explanation is in order as to whether the estimate is theoretical or based on experience. There seems to be more general interest in the statistical methods used to reach the announced conclusions than is usual in matters of actuarial statistics. The economic value of a life is so variously defined that there is no common factor in the estimates seen daily—unless it be the name, and even that is far from uniform—and the interest of the statistically uninitiated.

* * *

Professor Irving Fisher of the department of political economy of Yale University, a recognized authority in the field of vital statistics, prepared in 1909 "A Report on National Vitality, Its Wastes and Conservation." Although the figures used in this report were gathered during ten years ending in 1909, and utilized hastily by the author at the instance of the National Conservation Commission, of which he was a member, this report remains, in spite of contemporary adverse criticism, the most to the point in estimating the economic value of a life, of any publication to date. Appraisals of the valuation of human life to which Professor Fisher refers include those of Professors J. S. Nicholson, Mayo-Smith, Engel and Dr. William Farr.

* * *

By permission of Professor Fisher SAFETY ENGINEERING quotes from his "Report on National Vitality" this principle, with which, however, not all statisticians and economists are in accord: "The best method of estimating the economic value of life . . . is by the capitalization of earning power."

* * *

On this basic point Professor Willford I. King, formerly of the University of Wisconsin, now a member of the research staff of the National Bureau of Economic Research, thinks it is a first step necessary to decide whether the economic value of a working man's life is to be considered from the point of view of a man's dependents (he thinks it is impracticable to estimate any value for the life of a working woman, as "Marriage makes the problem too complex") or from that of society in general. Professor King would compute the first from the present and future value of the goods a man contributes (about 60 per cent of his earnings) to the support of his dependents; the second estimate he would obtain by determining "the amount society would feel obligated to contribute to his dependents in case of his death." The capitalization of earning power seems to Professor King, and doubtless to many others, "entirely inapropos in the case of a free man—for the free worker demands full payment from others for the services which he renders to them."

Further considering the valuation from the point of view of society in general, Professor King says that it seems to him impracticable to measure this value of a working man more closely than to say that such value is very much less than the (monetary) value of the working man to his family, which is equal to the present worth of all his future earnings less the amounts which he will spend for his own subsistence.

* * *

"In lieu of any estimates for the United States," according to Professor Fisher in the "Report on National Vi-

tality," "we may take Farr's figures for agricultural laborers as representing, roughly, the relative worth of a man or woman in the United States. To obtain the absolute figures, therefore, we need simply to multiply those of Farr by a constant factor representing the ratio between the average earnings in the United States and the earnings which Farr uses as the yearly income of an agricultural laborer.

"We take, in the absence of any good statistics, $700 per annum as a guess, but a safe minimum," [a footnote here explains that the best opinion, probably, in the United States did not regard $1,000 as excessive, but that the lower figure "is intended to include the earnings of women (including housewives as earners)"] "for the average earnings of workers of all grades, from day laborers to bank presidents . . . Since about one-fourth of the persons of working age are not workers, but are supported (for the most part) by the earnings of capital. the average should be cut down to three-fourths of this figure, or $525.

"Substituting this figure for the £31" [computed as the average gross earnings of workers of all grades] "in Farr's table, we can reconstruct it to represent the minimum worth of the average American life at different ages. The following figures are taken from the table thus computed:

Age	Net Worth of a Person	Age	Net Worth of a Person
0	$ 90	30	$4,100
5	950	50	2,900
10	2,000	80	700
20	4,000		

"From the table from which these figures are taken it is possible to base minimum estimates for (1) the average economic value of the inhabitants of the United States by using the census figures for age distribution of population; this calculated average is $2,900; (2) the average economic value of the lives now sacrificed by preventable deaths, using the age distribution of deaths, and the percentages of preventability; this calculated average is $1,700."

Allowance must be made in using these figures now, Professor Fisher cautions, for the present depreciated dollar.

* * *

Louis I. Dublin, statistician of the Metropolitan Life Insurance Company, says "At the present time, we go on the assumption that the net economic value of one year of human life is $100, i. e., the balance between production and consumption per capita is estimated to be $100 by a number of American economists."

The data used by this company in estimating the economic value of human life are to be developed for a more recent period than that now tabulated, and to be re-stated according to a project for the benefit of the safety and public health movement of the United States.

The present data of the Metropolitan Life Insurance Company (published in the *Annals* of the American Academy of Political and Social Science in 1906) include computations of future economic value at the respective estimated average annual economic gains of $200, $300 and $500, for ages 20, 21, 25, 30, 35, 40, 45, 50, 55, 60 and 64. These estimates of future economic value are apparently all subject to reduction by the ratio of the $100 assumed present net economic value of one year of human life to the higher estimated average annual economic gains used in the 1906 table. The future value for the $200 annual gain estimate at 20 years is $9,650; this figure decreases to $8,015 at 30, $5,090 at 40, $2,090 at 50. $325 at 60, and at the last age given, 64 years, only a residuum of $50.

The best method of estimating the economic value of life is by the capitalization of earning power. —*Irving Fisher*

Accident Prevention in the Rubber Industry

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Proceedings of the American Society of Safety Engineers

THE scope of this paper has been limited to the more important phases of safety work which are particular to the rubber industry, considerations of a general character such as apply more or less to all industries having been only lightly touched on, or entirely omitted. Generally speaking, all modern rubber mills are equipped with the latest fire protection and extinguishing equipment, factory hospitals and machinery guards; proper attention is also given to educational work regarding prevention of accidents, and to periodic inspection of cranes, elevators and all specially hazardous machinery.

The main causes of accidents in a rubber mill may be broadly classified in the four following groups: fire, small tools, hazardous machinery, and vapor poisoning.

FIRE

Approximately 75 per cent of the fires in rubber factories occur during the dry cold weather of January and February. This is mainly due to three causes:

1. Many of the processes require the use of naphtha and other flammable solvents, which in a heated dry atmosphere evaporate more quickly than in a humid one.

2. Fabrics and other combustible materials are drier and more liable to ignite.

3. Static electricity, which readily leaks to earth over the surface of moist fabrics, and through a moist air, accumulates and builds up a considerable charge and potential in a heated dry atmosphere.

The majority of fires occur in the spreading department, where waterproof fabrics are produced by spreading a thin film of rubber dough over the surface of a fabric, and afterwards eliminating the solvents by evaporation over heated iron plates or coils. The condition of rapid evaporation in a dry atmosphere is most conducive to the building up of electrical charge, and it is no unusual thing to see heavy sparks several inches long snap across the surface of such a fabric. In a humid atmosphere the usual provision of an earthed collecting comb of fine wire or tinsel is sufficient to carry off excessive static, but in dry weather this cannot be relied upon.

A device known as the Chapman Neutralizer which neutralizes the static charge by means of a high potential reverse charge, has been found effective on machines used for one purpose only, where the neutralizing bars can be installed in certain fixed locations, and the operations are of no complex. This is not always the case and the system is not flexible enough to meet the condition more frequently met with, where one machine is called upon to do several different operations.

Probably the best way of checking fires due to static electricity is to provide grounded plates for the employes working around these machines, ground the frames securely by a heavy copper wire, provide for artificial humidifying of the air in winter, (4 grains of water per cubic foot being usually sufficient, or about 40 degrees of humidity), and furnish a "steam blanket" for extinguishing a fire as soon as possible after it commences.

A satisfactory "steam blanket" can be obtained by running a ¾ in. pipe around the spreading machine plates, about 2 ft. above their upper surface, with small holes drilled every 6 in. to direct jets of steam towards the fabric. This device will extinguish a fire very quickly and with a minimum of damage to the ma-

*Received through "exchange of courtesies" between the Canadian National Safety League and the American Society of Safety Engineers.

terial. A hygrometer is sometimes installed in such departments to record the humidity of the air.

Similar precautions are also taken in the cement mixing depatment, and it is customary to conduct these more hazardous processes in isolated buildings to localize the risk, and avoid alarm and confusion in other departments.

Watchmen passing through these departments at night are not allowed to use an ordinary lantern. The best practice is to provide a well installed system of electric lights with keyless sockets in vapor proof globes, the switches being outside the building.

Exceptionally good ventilation is provided in all departments where flammable vapors can accumulate, both for protection against fire, and for the health of the employes.

A further cause of fires in rubber factories is spontaneous combustion of piles of scrap ground rubber. It is customary to store all such scrap in galvanized iron bins raised a few inches off the floor.

It is considered good practice in rubber factories to have two or more fire squads, under the direction of a local fire chief; these squads are called out at irregular intervals by various signaling devices, and competition is stimulated to promote efficiency.

ACCIDENTS DUE TO SMALL TOOLS

In every rubber mill there are a considerable number of operations calling for the use of various forms of cutting knives. Many minor accidents are the result, mainly due to slipping of knives or to carrying knives unprotected in the pocket. Pocket-knife shields are provided by some companies, and their use insisted upon.

Every encouragement is given to the employes to have cuts or bruises, no matter how small, attended to by the factory hospital, the danger of neglecting such wounds being vividly brought to their attention by striking pamphlets and illustrations displayed on the departmental bulletin boards.

Where new construction or demolition is going on, some companies make a point of posting up in exposed positions pamphlets, blueprints, or other illustrations of the special danger of treading upon unturned nails.

In some factories proper attention is given to cleanliness, a committee consisting of suitable officials, such as the factory nurse, assistant superintendent, and one foreman, the latter being chosen rotatively, making periodical inspections to see that the sanitary and ventilating arrangements are kept in good order.

HAZARDOUS MACHINERY

Of the great variety of machinery used in the modern rubber mill, probably the most hazardous from the operating point of view is that in the mill room. Rubber mills are mainly used for compounding into a uniform homogeneous mass the various ingredients which enter into rubber manufacture; also for warming this mass, after a period of rest in which it is allowed to mature, up to a temperature suited to the various operations carried out on the calenders.

Such a mill consists of two heavy cast iron rolls (22 in. in diameter by 60 in. long being the most popular size today) mounted horizontally in massive semi-steel side frames. Usually from three to six mills are driven from a single line shaft, pinions on the latter engaging with drive gears mounted on the end of the rear roll, and driving it at approximately 24 revolutions per minute. The front roll is usually driven from the back roll by connecting gears, its surface speed being from 66 to 90 per cent that of the back roll.

Every rubber factory has its record of accidents due to employes getting one or more hands caught between the mill rolls. Before safety devices were employed, these accident were expensive both to the company and the employe, the damage usually running into $2,000 or more, and the employe being either killed outright or crippled for life. In the early days the mill room was usually driven by a massively constructed steam engine, with heavy flywheel, and to shut down the mills by closing off the steam was too slow to be of any use in case of an accident. The mill drive pinions were usually provided with a lever-operated jaw clutch, but to open this clutch when the mill was under load, even on a small

mill, was a difficult and slow business requiring the services of another employe.

The earliest known quick stopping device which could be tripped by the mill operator was installed during the summer of 1893 at the plant of the New York Belting & Packing Company, Passaic, N. J., and was devised by their engineer F. W. Harding, for the purpose of safeguarding an employe who operated a mill at night, no other person being present to assist in case of accident. One week after the device was installed this employe got the left hand caught in the rolls, but by operating the quick stop with his right, was able to withdraw his hand from the mill and phone up the hospital. The man lost most of the fingers of the left hand, but the stop device was considered so satisfactory that similar mechanisms were installed on all the General Rubber Goods Mills of the Rubber Goods Manufacturing Company, now a branch of the United States Rubber Company.

This safety device consisted of a horizontal sliding bar, located about 18 in. above the center line of the front roll, and so arranged that when it was thrust forward or pulled back, it released a weighted lever which fell against a spiral projection cast upon the driving half of the jaw clutch. A wedging action resulted between the driving and driven halves which effectively separated the clutch within two revolutions of the line shaft. This corresponded to about 16 in. travel of the front roll, and was a great advance over previous practice.

Somewhat similar devices were developed by the large manufacturers of rubber machinery, and up to about 1905 this form of quick stop was considered as the best obtainable. It was not ideal however, as the strain on the line shaft and bearings adjacent to the clutch was very heavy during the disengaging period, and it was difficult to get sufficient attention given to the lubrication of the driven half of the clutch when the mill was idle and the clutch disengaged, resulting in the necessity of frequent rebushing and heavy maintenance expense. Mechanically it was preferable to key the pinions solidly to the line shaft, and allow unused mills to run idle. To do this involved the shutting down of the entire line of mills in case of accident; and as the engine or motor possessed considerable flywheel effect, it became necessary to install quick releasing cut-off couplings between the prime mover and the driven machinery, which could be tripped by horizontal rods over each mill. As the line shaft and mills run at very low speed, the inertia effects are relatively small, and even a light load on one mill will cause the line shaft to stop practically instantaneously when the cut-off coupling is released. When the mills are all empty, however, there is appreciable drift, due to friction within the coupling, sometimes amounting to two revolutions of the front roll of the mills. To remedy this, mechanical brakes have sometimes been installed on the mill side of the cut-off coupling, arranged to be automatically applied by the tripping of the coupling.

Many installations of this general type are today in use, their chief drawback being that in many cases the rigging required for tripping the cut-off coupling is quite complicated, rather unsightly, and not altogether dependable; also the lubrication of the cut-off coupling must receive exceptional care. In a recent installation of this kind, the tripping is effected by the de-energizing of an electric solenoid, installed as part of the coupling mechanism; each mill being provided with a small switch operated by rocking horizontal rods (commonly known as a cradle) located about 2 ft. above the rolls. The use of electric wires between the mills, and the cut-off coupling are distinct advances over the mechanical trip device previously used.

With the advent of the electric motor, the possibility of obtaining a quick stop by dynamic braking or by reversing the torque of the motor was early recognized. This method is known as "plugging" the motor, and with suitable automatic control entirely satisfactory results can be obtained, provided the motor has been designed for such service. In most cases some form of gear reduction is used between the motor and the line shaft, the motor running at from 500 to 600 R. P. M. and the line shaft about

90 R. P. M. The most generally used method of obtaining a quick stop with this form of drive is to interpose a magnetic clutch brake between the motor and the reduction gear, the brake being installed on the mill side, thereby checking all tendency to drift. Each mill is provided with a safety switch operated by a horizontal bar trip of the rocking cradle type, arranged to de-energize the clutch and brake through a relay. In order to improve the power factor of the plant load, there has been a growing tendency during recent years to operate the large mill lines by means of low-speed synchronous motors, direct-connected to the line shaft through a magnetic clutch. The clutch in this case is necessarily large and expensive, but very satisfactory quick stopping is obtained. By the use of the mechanisms above described the extent of the injury resulting from a mill accident has been greatly reduced and rarely extends beyond the loss of the fingers or the hand.

CALENDERS

The rubber calender is used for sheeting out rubber, sometimes frictioned into the surface of a fabric, and sometimes as a thin plain sheet. It usually consists of three or four heavy horizontal rolls, arranged vertically one above the other, and supported in massive cast iron side frames. The speed of rotation of the rolls varies for different grades of rubber and for the class of work performed, but generally speaking it is slower than that of mixing and warming mills.

There are two hazardous operations in the use of a calender: feeding gum into the machine, and threading fabric between the rolls to receive the coating of gum. The latter is the more dangerous of the two, and it is customary to run the calender at a low speed when performing the threading-in operation.

PROTECTING CALENDER EMPLOYES

Two methods of safeguarding the employes are in use. The first is to provide horizontally swinging rods, just above each danger point, or a safety pull rope, passing entirely around the calender, so arranged as to trip a safety switch which automatically cuts current off the motor and applies dynamic braking or plugging. The other is to install a slotted guard across the entrance to the rolls where the fabric is inserted, the slot being just large enough for the operator to pass his fingers through to the third joint, yet not to reach the actual bite of the rolls.

In some cases friction clutches or magnetic clutch brakes have been used between the motor and the calender, but the relatively small flywheel effect to be absorbed and the ease with which dynamic braking or plugging can be applied have usually decided in favor of doing away with any disconnecting device on this machine. Calender accidents, however, are relatively rare compared with those on the mill.

INSTRUCTION IN USE OF SAFETY TRIPS NECESSARY

The value of these safety trips on mills and calenders would be largely lost if the employes were not trained in their use. It is the foreman's duty in most plants to instruct all new employes in the method of operation, and in some factories the men are required to take turns in shutting down the mill line at closing time, under the foreman's directions.

TUBING MACHINES

The tubing machine consists of a steam-heated cylinder provided with a feed throat, inside which is rotated a closely fitted screw of long pitch. In principle and design this machine has much in common with the ordinary domestic meat mincer, except that it is larger, power driven, and steam jacketed. The rubber is fed into the throat of the machine, and is impelled by the progression of the screw through dies of various forms, heat being applied to maintain the plasticity of the material.

Most of the accidents on tubing machines occur on account of the operator's putting his fingers too far into the throat opening, and having the tips nipped by the worm. The remedy is to extend the throat to such length that if the operator keeps his thumb outside the opening when feeding the stock, his fingers cannot reach the worm.

Many factories have sticks for feeding

in the stock, but these seem to be used only when an inspector comes around, except on the large machines.

POWER DRIVEN PUNCH PRESSES

These are used in the rubber mill for preliminary die-ing out of stock into the forms of heels and soles. They consist of a top platen of heavy girder construction arranged to descend vertically and drive a cutting die through the sheet of rubber stock. Wood or fibre cutting blocks are placed beneath the stock to absorb the shock and preserve the edge of the dies. The press is operated from any position in front of the cutting block, by depressing a treadle which extends the full length of the machine.

Accidents are caused when the fingers are placed over the top edge of the cutting die caught by the descending platen, or when a press is started unexpectedly from shutdown.

To guard against the practice of handling dies from the top edge, safety handles or pins are tapped into the sides of the dies about 1 in. from the top. By training the employes to use these handles accidents from this cause may be largely eliminated. Treadle guards are installed, consisting of a board of the same section and somewhat longer than the treadle; this is rigidly fixed 5 in. vertically above the treadle. The operator is trained to rest his foot on this guard while placing the die in position ready for the next cut, thereby avoiding unexpected restarting due to the weight of the foot on the treadle.

PRESSURE VULCANIZERS

One of the most important processes in the rubber mill is that of pressure vulcanization. The pressure vulcanizer consists of a containing vessel usually cylindrical in form in which the articles to be vulcanized are placed, the chamber being sealed by a quick closing steam-tight door. Steam is admitted and the temperature brought to 247° F., at which value it is maintained for varying periods of time according to the work in hand. These vulcanizers are equipped with a pop safety valve which is tested about once every six months by allowing the pressure to rise in the vulcanizer until the valve pops. In case the valve sticks or does not pop at the designated pressure or slightly above, it is cleaned, adjusted and tested out again. An air vent consisting of a 1-in. pipe and valve is installed at the highest point in the vulcanizer. Before opening the vulcanizer doors after a heat, the steam is exhausted and the gage observed to make quite sure there is no pressure remaining within the vulcanizer.

From an accident-prevention point of view, the vessel is considered in the same light as a boiler, and it is insured and periodically inspected in exactly the same thorough manner. Flywheels, cranes and elevators are also considered in this class, periodic examination being made in each case.

VAPOR POISONING

In the compounding of certain rubber stocks, use is made of aniline oil. The safe handling of this oil calls for extreme care on the part of the employes. This gas is poisonous in very small quantities when inhaled, and as it has a pleasant odor and is not irritating, it does not give warning of its dangerous nature. Somewhat more gradual but very serious is absorption through the skin. The spilling of aniline oil on the clothing, hands or boots may result in severe poisoning by allowing the aniline to come in contact with the skin. It is also virulently poisonous when taken into the system through the stomach. Mills on which this oil is used are provided with hoods or canopies arranged to fit the mills as snugly as possible. These are connected up to exhausting fans which carry the gases out of the building. It is important that these ventilating provisions be ample, as an insufficiency in this direction may have fatal results.

A case occurred in one mill where an employe carried in his pocket for several days a box of Zymole Trokeys, which absorbed sufficient aniline oil during his working hours to poison him when he ate them. On another occasion an employe spilled some of this oil upon the floor, and upon attempting to mop it up he became overcome by the fumes and shortly afterward died.

The main considerations in safeguarding employes who have the handling of aniline oil are ample ventilation, cleanliness of employes, and their abstinence from alcohol. Vinegar is used to mix with the oil when it is spilled or slopped over, acting as a neutralizing agent.

ACCIDENT REPORT SYSTEMS

It is the practice in some rubber mills to have weekly accident reports prepared by the factory doctor or attending nurse. These reports state briefly the nature of the injury and how it happened. Copies are forwarded to the factory manager, superintendent and engineering department. In one factory it is the practice of the factory manager to have a particular man investigate and report on the cause of all accidents, it being his duty to state clearly exactly what occurred, and to recommend means to prevent the recurrence of such an accident if that seems possible. This method of following up every accident no matter how small has much to recommend it. It is also the practice in the larger mills to employ a particular man to take charge of and follow up all safety work. This includes acting on the reports of government inspectors, insurance reports and the recommendations of the local factory safety committee where such exists.

Unless some such method of following up safety and accident recommendations is put into force, they are liable to be relegated to the pigeonhole in favor of the more vital concerns of production, until some fresh accident brings out the necessity for taking action.

Diagnosis of Hazardous Occupations

THE Metropolitan Life Insurance Company acknowledges having drawn upon "all works on industrial hygiene" in preparing the second edition, revised, of its pamphlet, "Occupation Hazards and Diagnostic Signs: A Guide for Medical Examiners, Regarding Impairments to Be Looked for in Hazardous Occupations." The new edition is enlarged over the old, and includes consideration of these nine hazards of employment: abnormalities of temperature; compressed air; dampness; dust; extreme light; infections; poor illumination; repeated motion, pressure, shock, etc; poisons.

Many of the impairments resulting from these exposures are not at first manifest to the doctor upon examination, so that the insurance company has prepared two lists to enable the examining physician to find the particular defects caused by a given occupation in the minimum of time. The first list is an index of occupations, arranged alphabetically, and referring to a keyed description of symptoms of particular hazards in the second list.

There are about 700 occupations listed, unclassified, by the specific name most likely to be used by the person engaged in each occupation. That there are 700 industries in which employment is regarded by the insurance company as especially hazardous does not follow, as several specialized occupations in one industry may be listed and counted separately. Even the farmer, who was fatally involved in only 3.5 accidents per 10,000 employed in his occupation in 1918, is listed as subject to two industrial hazards. Miners have ten hazards assigned to their occupational risk, and electricians only one. It is apparent that the number of risks delegated to an occupation cannot be used as an index to its comparative danger. The indexing done for occupational hazards will undoubtedly prove of value to others than the medical examiners of insurance companies, and when others make use of it they must bear in mind that it is not subject to statistical interpretation.

The list of health hazards gives concisely the symptom, condition or disease to look for, and a contained alphabetical list of the occupations which offer exposure to each hazard.

What the Safety Inspector Must Do and What He Has Done

By J. G. Shaw

Supervising Inspector, New York District, Travelers Insurance Company

Proceedings of the American Society of Safety Engineers: A Discussion of the Purposes and Results of Safety Inspection Work from the Insurance Companies' Viewpoint

SAFETY inspection in the various plants and industries is for the purpose of recommending ways and means of preventing accidents, by safeguarding dangerous machines at the point of operation, moving belts and pulleys, gears, clutches, and other parts of machines which are dangerous and to which persons may be exposed.

Sanitation and hygiene have also to be provided for according to conditions met with. The introduction of Safety and Welfare Organizations, to which is added First Aid, are also very important features in connection with industrial activities.

But I think the most important of all is the inculcation in the mind of the operator of thinking and acting safely. Educating the great mass of industrial workers to think and act safely is a most herculean task, but we are getting at it gradually through the efforts of the safety inspector, the safety engineer and the broadcast distribution of safety literature. Some employers, and I might say a good many of them, are seeing the light and beginning to realize the economic benefit to be derived in protecting their workmen.

There are forms of insurance that indemnify the manufacturer for loss of production, but there is none I know of that compensates for the loss of an experienced or expert workman; it is a direct loss to the employer. The compensation awarded is not affected by any superior skill on the part of the injured; his award is based on the nature of injury sustained, regardless of any higher ability. In the State of New York in the year ending June 30, 1920, there were something like 345,672 accidents involving an expenditure of about $15,000,000 for compensation; in the same period of 1919, there were 57,288 fewer accidents and nearly $3,500,000 less experienced for compensation. To overcome his enormous waste in the task set for the safety inspector, the safety engineer and such others as are concerned with this work.

Speaking of the safety inspector, to be successful, or to make any headway with the average manufacturer, he must possess the proper personality. In fact the manufacturer's conception is usually based on the fact that an inspector is a harbinger of expense and for that reason he greets him with more or less suspicion. I know of many such cases that started off in such a fashion, but when the safety inspector was given an opportunity to explain his mission, the attitude of the employer changed very materially and he would welcome the safety inspector, and seek his advice in many cases pertaining to the safe and economic conduct of his operations.

With the advent of July 1, 1914, the safety inspector's duties became more burdensome and exacting. It was at this time that the Compensation Law became effective in the State of New York, the requirements of which made it ever so much more difficult for the safety inspector; the new form of report was much more voluminous. Conditions which heretofore were treated more or less casually, had to be noted and recommendations made to rectify adverse situations, so that when the safety inspector had made up his list, there would be an array of items that would astonish the employer and make him stand aghast. It is quite natural to suppose that this created a good deal of resentment in the latter's mind, the introduction into the new system was so sudden. However, I am pleased to say that co-operation is

now taking the place of resistance and it is to be hoped the feeling will expand.

In many of the large plants the inspector has a colleague in the person of the safety engineer. Generally speaking, he is willing to co-operate and discuss with the safety inspector the best ways and means of putting the plant in good shape, safeguarding machines, correcting improper conditions, thereby increasing production and cutting down accidents which result in economic losses.

To be successful in his particular and important calling, the safety inspector should possess a diversified personality —staunch in persistency, judgment, diplomacy, coupled with the faculty of winning others to carry out such plans as he may have conceived for the betterment of conditions. He must have the full confidence of the management, and be vested with proper authority to make such changes as can be shown to be of advantage.

I do not think that the indifference shown by some managers or superintendents is due entirely to lack of interest in providing safe conditions for their employes to work under, but rather to the fact that they have not been fully informed as to what has been achieved in the way of accident prevention and the economic profits which result therefrom. Just as soon as interest in such matters is aroused in the minds of the management, and co-operation seems certain, then is the time to begin what should develop into a progressive system. Let us assume, for example, that the safety inspector has won the management to the idea of introducing safety methods into his plant, and he wants to know how he is going to set about it. It will be necessary to explain that individually he has not to carry a great deal of the responsibility; that is done through the superintendent, foremen, or workmen's committees. But it is vital that he show genuine interest in the work and thus encourage and sustain those whom I have mentioned and upon whom the working out of the details connected with this work is dependent.

Other important items which are developed as the result of the safety inspector's examination are as follows:

1. It is the purpose of the insurance company to determine the insurability and proper classification of operation.

2. It is the purpose of the insurance company to make recommendations for improvement, which if complied with, will serve to protect the employes of the assured as well as to protect the insurance company's interests.

3. It is the purpose of the insuring company, at least as far as schedule-rated business is concerned, to modify the rate for a risk in proportion to the safety work which the assured have carried out, thus showing the relative position of the risk as respects other risks of the same classification in connection with safety work accomplished.

Now with regard to results obtained from the efforts of the safety inspector. This applies to recommendations for the betterment of conditions, the safeguarding of dangerous machines, the improvement of lighting, sanitation, etc., and the very important one of installing a safety committee in plants where an organization of this kind is highly desirable and necessary. I would say that the results are not very satisfactory, generally due to the lack of interest on the part of the management; some absolutely refuse to consider it; others say, "Oh, well, we will think it over and see what can be done;" that is a long time ago, and they are still laboring under the thinking-it-over process. There are some, I am happy to say, who have taken an interest in the scheme, and even where they approached the idea with more or less timidity, are now working whole-heartedly on the subject, especially where the results have shown the value of their co-operation and support.

Along this line of safety work the surface, so to speak, is barely more than scratched. There is an enormous field of labor before the safety inspector and the safety engineer, and it is my firm belief that the real awakening of employers to the beneficial application of safety, welfare and education, by means employed by insurance companies and others, to their employes has not fully arrived. I am speaking now in general terms. Take, for instance, the United States Steel Corporation as an example. Safety methods were introduced in their opera-

tions as early as 1906, and it is estimated that in the 12 years following, ending 1918, there was saved from death or serious injury 23,195 workmen—based on the company's accident record prior to 1906. This saving was effected among approximately 250,000 employes. Other large steel concerns made similar great reductions in their accident losses; so that the credit for the introduction of real organized safety work in what might be termed self contained industry might well be credited to iron and steel.

It is quite conceivable that when possibilities of this kind became more generally known other industries began to take notice, and some of the more prudently inclined did really start something of the sort in their establishments, more or less crude; and I will say that where they showed a disposition to stick to it and have perfected the organization, the insurance companies have co-operated with them to the fullest extent, giving valuable advice, supplying literature for their bulletin boards and giving safety talks during the get-together periods of the different committees and workmen.

I might add in connection with results from the insurance company's point of view:

1. The insurance company is enabled to give the assured a rate which fits the plant concerned under the proper classification.
2. It enables the company to protect its interests through preventing accidents, as well as to promote the interests of the assured, as accidents lower both efficiency and production.
3. It enables the insuring company to establish and maintain safety educational programs which help to reduce accidents and lost time for employes and employers alike.
4. It enables the assured to obtain the best possible rate for the classification under which the plant is covered by pointing out to them in detail the items which affect the rate and which, if given attention as indicated by the insurance company's safety inspector, may be productive in further reduction of the premium rate.
5. The insurance company's inspector teaches the assured how to do all these things.
6. If the assured is willing to be guided by the insurance company's help as outlined above, he has a plant and equipment which has been completely provided with proper physical guards.
7. The employes have been taught to think safety.
8. There will be a safety organization inside of the plant which is an active agent in creating and maintaining the safety spirit.
9. He will have obtained a rate which is the minimum for the classification involved and last, but by no means least, the plant will be physically free from accidents.

Now when all is said and done, it may be asked, Who benefits? and the answer is, Everybody. Today we are introducing safety talks to our school children which we hope will be reflected in their actions when they become grown-ups; but what about the great mass of humanity of the present day who have not received such early caution? It is to those that our efforts must be directed and in proportion as we sow, Safety Thoughts, Safety Actions by Education, so shall we reap the reward in Results.

Canadian Engineering Standards

FORTHCOMING specifications from the Canadian Engineering Standards Association include the following subjects: wire rope, steel railway bridges (revision), highway bridges, incandescent lamps, wood poles for transmission lines, watt-hour meters, concrete and reinforced concrete, and Portland cement. A proposed future activity is the standardization of fire hose thread and couplings. It is also desired to co-operate with the American Engineering Standards Committee on safety codes for elevators, logging and sawmill machinery, tolerances on shafting and standardization of gearing, with a Dutch standardizing committee on the round numbers to be adopted as the metric equivalent of inch sizes, and with the Swedish standard committee on the width across flats of nuts and bolt heads.

The Fight Against White Lead

TO eliminate occupational poisoning from the white lead used in paint is one of the problems which has received from the beginning the attention of the International Labor Office established in Geneva. The International Labor Conference in its fifth plenary sitting, October 28, 1921, appointed a commission to deal with the proposal to prohibit the use of white lead in paints. The chairman of the commission is Obed Smith, representing the Canadian government. Two meetings of the commission have been reported in the *Daily Intelligence*. They presented heated attacks on and defenses of white lead, but had reached no conclusions when the conference adjourned, November 11.

* * *

Before the conference the International Labor Office had sent out to the States to take part in the conference a memorandum-questionnaire on the subject. This document opened with a subordinated-to-the-incidental statement that "it is now technically possible to replace white lead in painting by efficient substitutes." This declaration precipitated a storm of protesting documents from participants who had found the substitutes unsatisfactory.

On November 1 the National Paint, Oil and Varnish Association, of the United States, telegraphed to the International Labor Conference an "earnest protest against proposal to prohibit the use of white lead in painting."

* * *

The main defensive document, issued in rebuttal to the International Labor Office's memorandum before the conference by the London Chamber of Commerce, made the following criticisms:

1. In regard to the *medical* aspect, the essential facts are ignored that the symptoms which are characteristic of lead poisoning are not specific; that it is generally recognized that the diagnosis of lead poisoning is a matter of extreme difficulty and one requiring special knowledge; that many symptoms, formerly ascribed to lead poisoning, are now known to be due to other constituents of paint, namely volatile thinners, such as turpentine and its substitutes; and that the tendency to attribute symptoms to lead poisoning in the case of any one known to be a worker in lead vitiates the whole of the statistics of lead poisoning.

The dangerous nature of thinners has long been known, and it has been common knowledge that paints containing them, when used in confined spaces, entailed grave risks to the workers, unless there were efficient ventilation. Attention has only recently been given to the physiological effects produced by constant exposure to such vapors when in a state of dilution similar to that which obtains in the ordinary practice of painting.

Turpentine and its substitutes are constituents of all paint with a metallic base, whether lead or zinc or other. It is therefore a fact of first importance that painters are continually exposed to these vapors, as they usually stand within 18 inches of the surface they are painting; also that the substitutes for lead require a greater quantity of thinners; further, that the present-day vogue of flat finishes doubtless contributes largely to sickness among painters. . . . .

The paramount importance of dust, especially metallic dust, whether its action be toxic or only mechanical, is an outstanding feature of the literature of industrial hygiene, and the practical omission of any reference to it makes it impossible to consider the Memorandum as a serious contribution to the study of the problem of paint-poisoning.

An example of obviously fallacious reasoning is the comparison of the ratio of death to sickness among painters in England as compared with the similar ratio among workers in the regulated lead industries. This overlooks the fact that the notification of cases of lead sickness among painters is not compulsory (as it is for the regulated industries) and that the figure of cases of lead poisoning among painters upon which the calculation is based is wholly fortuitous; a circumstance which invalidates the calculation. Of a similar class of reasoning is the ascription of the diminution of cases of lead poisoning among the staff of the Pullman Company of America to the replacement of white lead by lead sulphate, ignoring the fact that this replacement coincided with the establishment of proper regulations.

2. The Memorandum displays ignorance of the *economical* aspect, also, by the egregious statement that "it is very probable that an increased demand for plumbous zinc white would lead to a decrease in price."

3. In conclusion, nothing is more discreditable in the Memorandum than the misrepresentation of the proposals of those who contend that Regulations are the only reasonable, and the only effective way of dealing with the problem. These proposals are represented as being the distribution of leaflets and the provision of washing apparatus and "in the case of certain specially dangerous work, such as rubbing down and scraping, a reduction in the hours of labor, the exclusion of apprentices and the use of respiratory masks." This is a ludicrous understatement for what is proposed by Regulations.

Industrial Standardization

[Arguments for industrial standardization, aside from considerations of working conditions, are admirably summarized below by the American Engineering Standards Committee. Selling prices are affected by production costs and production costs are determined by the degree of efficiency attained by the working force. The greatest efficiency is scored by the working force that maintains the highest physical condition and suffers the fewest accidents. Sickness and accidents affect production cost. All of these things being true, accident prevention, hygiene and sanitation are factors of no inconsiderable importance, if they are not fundamental, in the movement for industrial standardization. The final test of production, and of all other economic relations between the buyers and sellers of fabricated articles, is the highest possible production commensurate with the highest possible degree of security, health and physical and mental comfort for men and women workers.]

INDUSTRIAL standardization stabilizes production and employment, since it makes it safe for the manufacturer to accumulate stock during periods of slack orders, which he cannot safely do with an unstandardized product.

It reduces selling cost. This is generally overlooked. Possibilities of reduced costs are generally even greater in distribution than in production.

It enables buyer and seller to speak the same language, and makes it possible to compel competitive sellers to do likewise.

In thus putting tenders on an easily comparable basis, it promotes fairness in competition, both in domestic and in foreign trade.

It lowers unit costs to the public by making mass production possible, as has been so strikingly shown in the unification of incandescent lamps and automobiles.

By simplifying the carrying of stocks, it makes deliveries quicker and prices lower.

It decreases litigation and other factors tending to disorganize industry, the burden of which ultimately falls upon the public.

It eliminates indecision, both in production and utilization—a prolific cause of inefficiency and waste.

By concentrating on fewer lines, it enables more thought and energy to be put into designs, so that they will be more efficient and economical.

By bringing out the need of new facts in order to determine what is best, and to secure agreement on moot questions, it acts as a powerful stimulus to research and development, and it is thus in decided contrast to crystallization resulting from fixity of mental attitude.

It is one of the principal means of getting the results of research and development into actual use in the industries.

It helps to eliminate practices which are merely the result of accident or tradition, and which impede development.

By concentration on essentials, and the consequent suppression of confusing elements intended merely for sales effect, it helps to base competition squarely upon efficiency in production and distribution and upon intrinsic merit of product.

Standardization is increasingly important for the maintenance and development of foreign trade. There is strategy in nationally recognized "American" specifications.

The efficiency of competing countries, increasing through national standardization programs, is liable to transfer competition from foreign markets to our own shores.

Joint effort in bringing about standardization within and between industries almost invariably leads to better understanding and to beneficial co-operation along other lines—a step toward the integration of our industries.

The final test of production, and of all other economic relations between the buyers and sellers of fabricated articles, is the highest possible production commensurate with the highest possible degree of security, health and physical and mental comfort for men and women workers.

Electrical Hazards Are More Dangerous Than Mechanical Ones

By W. J. Pefferly

Square D Company, Detroit, Michigan

Proceedings of the Tenth Annual Congress of the National Safety Council

THE electrical hazard should be one of the first objects of attack by the safety engineer.

Why Is Electricity, When Not Properly Installed and Safeguarded, a More Dangerous Hazard Than a Mechanical One? The eye and the brain work in harmony. The instant the eye observes an object in motion, such as a gear or belt, the brain impels the feeling of fear and caution. With electricity, that invisible force, there is no motion; the distributing installation, control apparatus, etc., look harmless. How can we overcome this motionless hazard? Were it possible that we inject the "fear of electricity" into the minds of the people who come into our plants, in such a manner as a child is taught to keep away from fire, and the same watchful eye placed over these factory employes as a mother holds over her child, perhaps we could "get away" without taking any safety precautions, but that is one of those "things that never happen." Even the turning gears, with their warning sounds, claim their proportion of victims, so that our only recourse is *the proper installation of electrical apparatus, and at that, the best and most practical obtainable.*

HIGH TENSION ELECTRICAL CURRENTS

By high tension we refer to voltage of over 600 volts. There are still a few cases where an electrical man considers these voltages to be harmless. The result is easily conceived.

Although the majority of exposures to this high voltage are confined mostly to employes of lighting, power, and railway companies, we cannot overlook the fact that we have some similar conditions in industry.

The average industrial plant to-day buys its electrical current from central stations, having it carried into the factory as high tension and then transforming it into low tension voltages, ranging as operative requirements demand.

In the majority of cases, as should be in all cases, we visualize our high tension equipment such as transformers, oil switches, lightning arresters, etc., as being installed in an isolated outbuilding, known to the electrical man as a sub-station or transformer house; we see that only experienced electrical men have access to this sub-station. We cannot let this prejudice us against supplying safety precautions and too much weight cannot be given to the fact that experienced men are not absolutely immune from accident.

I have seen cases where the designing engineer, when designing a transformer house, laid too much thought on a compact and neat layout, forgetting that at one time or another it would be necessary to repair certain apparatus and require the man undertaking this work to use extreme care to avoid coming in contact with live parts.

I have also seen cases where this apparatus such as the disconnect switch, lightning arrester, etc., were left without any screen protection whatever. Our remedy is to allow sufficient room in back of the board as well as in the front, the entire outfit being enclosed in a heavy wire screening. Heavy rubber matting should be placed over the entire area of the floor within the enclosure.

In some plants I have often observed that this transformer house is used as a wareroom for storing obsolete material. This is another condition that should be eliminated in considering safety.

LOW TENSION, 600 VOLTS OR LESS

Our greatest hazard in the factory is low tension distribution. It is often contended that this voltage is harmless and that it can be taken across the fingers

without causing any appreciable damage. This may be true when conditions surrounding are perfectly insulated. Should the person in question be standing in a grounded condition, the shock is sufficient to cause death. It is agreed that one-half ampere passing through the body is sufficient to prove fatal. On the other hand, should the person coming in contact with a live wire or switch, do so accidentally, it is more apt to prove fatal. As an example of the above condition, a revolver is discharged in a room of which you have been previously warned. The shock is not so noticeable as in the case of a man laying his fingers across the circuit. The nervous system is set ready to receive this impulse. Should that revolver have been discharged without a warning, your heart would have missed a beat or two, comparing with an accidental contact. Now if this bodily effect, caused by a sudden shock or noise is true, what will be the condition of the body to withstand an electrical current passing through it, after being rendered in a frightened condition?

SWITCHBOARDS

The average designing electrical engineer puts his greatest price in a highly polished switchboard. He claims that this is one way in which he can show a quality job. I personally recommend a dead front board, exposing no live parts, although I will admit it does not show the high polished copper, the fact remains that it is 100 per cent safe.

During my experience, I have built many dead front switchboards with safety switch units. This makes an attractive switchboard and has many advantages not offered on the open board, which I will bring out later. All wiring is concealed within the switch cabinets and troughs, placed on the back of the board. Thus we can minimize on space and still maintain safe working conditions.

Where an open board already is installed, we should make conditions such that accidental exposures will be reduced to a minimum. The open front board should be protected by a stout screen, extending 7 feet above the floor level. Heavy rubber matting should be placed within the enclosure.

WIRING DISTRIBUTION

In every electrical installation there is always a small amount of leakage and a slight grounded condition is always prevalent. On open work, this is more apt than in a conduit system, being caused from vibration of the building and gradually breaking down the insulation on the wires at the supporting points.

Our remedy lies in the fact that all wires should be placed within a steel casing or conduit, and especially so where subject to mechanical injury.

SWITCHES

I have gone into factories and seen one of the best conduit installations ever brought to my attention. They were jobs of which any electrical man could have been proud. But after going to all this labor and expense of putting in conduit over the entire system, he comes to a point of control and installs a contrivance known as an open-knife switch placed within a service box or steel cabinet. The folly of this installation can readily be seen, as the operator, whenever he desired to start or stop the motor, had to reach inside of the box and expose himself to the copper switch jaws. Now why place the wire in conduits, causing a large expense, when the switch is exposed, which is the point that must be operated, and expose the same copper that is in the wire and carries the identical current-load? This is an example of "Penny Wise, Pound Foolish."

The installation of safety, exterior operating switches is our remedy. These switches should be so marked as to indicate whether the switch current is closed or open. Provision should be made for locking the box "closed" and also for locking the switch in the "off" position. This latter precaution taken, should a repair man be working on the line or on the machine which this switch controls, he can lock the circuit "open" without danger of it being "closed" by other than the operator in charge.

SWITCHES AHEAD OF COMPENSATORS ON MOTORS 7½ H. P. OR OVER

It is contended by some electrical men that the compensator or auto started con-

trolling motor of this size is both a starter and a switch. This contention is all wrong, as the Board of Underwriters specifically states that each motor with its starting device, the compensator being the starting device, shall be controlled by a switch, which disconnects all wires, and to be located within access of the operator. This is only a necessary safety precaution as it gives the operator two points for control. The compensator is a complicated mechanism and is more apt to break down than a simple disconnect switch. Another feature to an installation of this kind is that it permits a repair man to work on the compensator with the current "off."

FUSE PROTECTION

Too much cannot be said on this subject. You may go into one of the best electricity equipped plants and find that fuses have been "padded." It may be the work of some machine mechanic, that he may be able to overload a machine and in his estimation increase his production, although he will not take into consideration the damage he is doing to machinery and that he is increasing the possibility of fire hazard, by overloading the carrying capacity of the electrical wiring.

One remedy for this "padding evil" (which seems to be the indoor sport for the average person who knows very little electricity) is to have a thoroughly experienced man in charge of this important phase of electrical safety. By having distribution circuits fused with the proper fuses and keeping circuit breakers adjusted to the minimum to carry the load, we are giving the victim a chance—as when either of the above "blow" the circuit is opened.

FUSES ON ALL MOTORS OF 5 HORSE POWER OR LESS, STARTING DIRECT ON THE LINE

A starting switch should be used which provides for a starting and running fuse, as the starting current is 100 per cent greater than the required running current, the fuses to withstand this surge would be of too high a capacity for running protection.

EXTENSIONS AND DROP CORDS

Avoid as far as possible the use of extension and drop cords. Should these be absolutely necessary, use only the best reinforced cord. These should be kept from lying on the floor, as some object running over it would break down the insulating. Seriously avoid the use of brass sockets as they often ground and cause serious burns if the person is standing in a grounded condition. The socket in the use of extension should be a porcelain shell socket, having no exposed live parts and equipped with a wood handle.

PROTECTION ON MOTOR AND ON OTHER EXPOSED CONNECTIONS

Careful consideration should be given all motor leads, compensator leads, etc., having exposed connectors. These should be well taped with rubber and friction tape, thus lessening the possibilities of the friction tape alone becoming saturated and causing a leakage.

ELECTRICAL DEPARTMENT

Often a situation is brought to my attention where an industrial plant is equipped electrically in the best possible manner, but some member of the electrical department will put in a temporary job, or will use extensions, etc., while he is working on a job, with a "cock-sure" idea that the work is only temporary, or in the latter case, that he will be the only person to handle this "jumble." As safety men, we should see that this workman does care for his life; we do not want to have the responsibility of his death or that of another laid upon us. Our solution is to get rid of such careless employes, and the sooner the better

THE ELIMINATION OF GROUNDED CONDITIONS

As we all know, damp surroundings are always prevalent at one place or another in our industrial plants. More so if the floor is located below ground level. Environments of this kind are ideal conditions for a person coming in contact with a live electrical circuit to produce a shock sufficient to cause death, the liability being more than in coming directly grounded systems of street railways and other electrical lines induce a higher vol- across a low voltage circuit, as the tage to pass through the body. The

remedy for a case of this kind is to remove this conductive ground. Although in some industries, and in most cases there are always places and conditions found where the elimination of dampness is almost impossible.

The possibility of a person receiving a fatal shock under these conditions can be greatly reduced by the grounding of all dead-metal parts on the electrical equipment. By dead-metal parts we refer to conduit switch cabinets, motor frames, etc. As the resistance of the body is far higher than that of a metallic circuit the current passing through the body will be almost nil. A ground protection not only protects the operator from receiving the majority of the shock, but if any live side of the circuit should become grounded, the current will pass to the ground and if the circuit is fused to the right capacity, it will cause the fuses to blow, the signal of a condition which must be remedied.

Ground wires should be the same size as the circuit wire and should be preferably grounded to the water system at the nearest point where it enters the building.

MAKE SAFETY ALTERATIONS TODAY

Our responsibilities are getting larger every day as the use of electricity is becoming more prevalent. Let me warn you of the greatest of all hazards, "procrastination." *By making safety alterations today, you may save a life tomorrow.*

Survey of Safety Literature

THAT industrial and social welfare libraries are giving increasing attention to the collection of safety literature is one fact brought out in the recent survey conducted by the national Special Libraries Association. There are five or six libraries largely specializing in the collection of safety literature, and a dozen or so more that are giving increasing emphasis to this subject.

One safety library which acts as a clearing house of information reports that its data covers the "accumulated experience of efforts to reduce accidents, as represented by safety devices, photographs, blueprints, rules and regulations, and literature on safety organization." During one year this library answered 3,100 inquiries. A co-operative arrangement has been entered into by this and several others of the leading safety libraries by means of which new literature of interest received by each library is made available to all the others.

LARGEST SAFETY LIBRARIES

Among the more important safety libraries may be mentioned those maintained by the National Safety Council, the Safety Institute of America, the Independence Bureau, the Pennsylvania Compensation Rating and Insurance Bureau, the National Council of Workmen's Compensation Insurance, and the National Workmen's Compensation Service Bureau. Many of the civic and social welfare libraries are giving increasing attention to the collection and preservation of safety literature.

SPECIAL LIBRARIES DIRECTORY, EDITED BY DORSEY W. HYDE, JR.

The complete findings of the Special Libraries Association's survey have been published in the form of a "Special Libraries Directory," edited by Dorsey W. Hyde, Jr., president of the association, Mills Building, Washington, D. C. In so far as is known, this directory represents the first attempt at a comprehensive study of American special informational sources. In using this list it is necessary to bear in mind the classifications used, as there is no name-of-institution index. There is a geographical section.

In addition to safety and allied engineering, and civic subjects, the directory furnishes a key to sources of information on such widely differing topics as Taxation and Theology, Astronomy and Automobiles, Dyestuffs and Diplomacy, Folklore, Furniture and Finance.

Editorial

THE ART OF SAFETY POSTERS AT HOME AND ABROAD

THE safety bulletin-board, in America, is the art exhibition of the factory; it is often the lecture-platform and the vaudeville theater as well

Admiration of American safety artists has predisposed the public mind to a constant and high regard for the profession that writes the safety posters in Uncle Sam's domain.

On the other side of the world safety-poster art has evoked unfavorable comment. A South African mining paper has published the opinion of an Irish workman in the mines:

"Why is it that nowadays we nave nothing fresh in the way of posters? Just a repitition of the ould ones that came out whin Adam was a boy. Why don't they send us some more nice pictures like the wan of the little boy sticking a pillow into the sate of his trowsis, and what happened to Safety Sam and Simple Simon? Did they lose the patterns? Or did they have the patterns framed and stuck up at home, so that no one could pinch them wans sent to the mines? Maybe they'll be making their fortunes out of Dixon's originals. And then, the bilingual side of the question. What the Divil is the good of sending us the English picture and sermon in January, and the Dutch picture and sermon in July? Why don't they sind the two together? And thin, when they are cutting the paper, why don't they cut it square and not cruked? Cruked paper makes the people think that the fella pasting the things up was drunk. But how the Divil can he make them look square when they are cut cruked?"

All of which, it must be remembered, applies to South Africa and not to the artistic creations "made in America."

SCOTT WAS NOT CONNECTED WITH INDUSTRIAL SAFETY

To the Editor of SAFETY ENGINEERING:

SIR: I have read the editorial in your issue of November headed "Booze and Safety." The press dispatches seem to have caused a misapprehension of the facts.

Scott was a city official, in charge of the Police, Fire and Water Works departments. He had no connection with any industrial concern, much less with the State Industrial Commission of Ohio.

While Scott was convicted, most of the people here are satisfied that a great deal of the evidence was perjured. He was undoubtedly guilty of some of the things charged against him, and has been denied a new trial. He was sentenced from 2 to 10 years in the Ohio Penitentiary.

I am writing this to correct the impression that others may also gain from your editorial that Scott was connected with industrial safety activities.

J. M. WOLTZ,
Safety Director, Youngstown Sheet & Tube Company.

December 6.

[The main point is that a "director of safety," who is convicted of "bootlegging," is a migty poor director of safety.]

DATES BACK TO DEUTERONOMY

To the Editor of SAFETY ENGINEERING:

SIR: In the October issue of SAFETY ENGINEERING, page 173, in an article entitled "Who Originated the Safety Movement?" there is a statement that two or three of the European countries are claiming this honor.

I think you will have to go further back than that to get the origin of the safety movement. The oldest reference that I know of is in the Bible, in the book of Deuteronomy, twenty-second chapter, eighth verse.

G. E. SANFORD,
General Electric Company.

West Lynn, Mass.

The Fatal Staircase

THIS title might be used, and perhaps has been used, for a bit of lurid fiction. But it writes itself, with sufficient frequency to be startling, in the annual fire record of the Nation. Lives are lost, cripples are made every year because staircases are not constructed safely. Grewsome victims of the mistakes or negligence of architects and builders sometimes lie in layers, at the bottom of a "flight" of stairs. Given a fire, a panic and a bad staircase and the chance of egress from a burning building, or from a part of the building, is a slim one.

The picture shows the construction of a staircase in a five-story brick tenement at No. 108 West 17th street, New York City, where a fire occurred on November 15 at 3.10 a. m. The property loss was only $40,000 but 12 persons were burned to death and 30 were injured. The construction of the staircase is shown by the illustration.

Fire reports received and classified by SAFETY ENGINEERING show two or more fires a week in apartment houses, flats and tenements. Doubtless, in every large city, cheaply constructed tenement houses are full of fire perils. Schools (mostly private), public halls (usually in small places), motion picture theaters and other places of assemblage furnish, from time to time, a fire-panic-staircase tragedy.

The tenement house fire in New York last month recalls, in a way, the school fire in Peabody, Mass., on October 28, 1915, which resulted in the death of 21 pupils, in age from 7 to 17 years. Contemporaneous comment was that this school (St. John's Parochial) exemplified "the ignoring of every principle of safety when the building was erected."

Unfortunately unsafe construction is not uncommon.

Photo by O. F. Browing, N. Y.

Staircase in the five-story brick tenement house, 108 West 17th street, New York City. Fire, November 15, 1921, at 3.10 a. m. Twelve persons were burned to death and 30 injured. The construction of the building is indicated by this photograph of a staircase, taken soon after the fire.

Electricity and "Electricity"

By C. Albert Gasser

Inspector of Combustibles and Fire Risks, Newark, N. J.

[In his latest annual report, referring to fire alarms in 1920 charged to electricity, Mr. Gasser said: "The 195 alarms charged against 'electricity' is misleading, to say the least, and a study of the sub-divisions of this item disproves instantly a statement recently made in general terms to the effect that a very large proportion of the Nation's fire loss was due to electricity, which presumably meant faulty wiring and other electrical carelessness. No less than 126 of these 195 alarms showed no loss recorded, leaving only 69 actual fires, and these included static electrical fires in manufacturing plants, of which there were 8. Electricity was charged against alarms for 77 trolley cars, 44 automobiles and 20 street wires, There were only 13 in dwelling houses, 17 in factories and 4 in stores. The loss from this cause was $155,219.17. Curiously enough, one of the wire fires was in an organ and another in a Victrola. There were 5 fires, most of them serious, because housewives in using the handy electrical irons forgot to turn off the current. Of course, these irons accumulate heat and the ironing board soon ignites."

SAFETY ENGINEERING asked Mr. Gasser to go more into particulars, if he would; to do justice to electricity and, to some extent, suppress "electricity." The article that follows is his response to that invitation.]

"AND now there abideth Faith, Hope and Charity, these three, but the greatest of these is Charity."

Also, we have with us Spontaneous Combustion, Mice and Matches and Electricity, these three, but the greatest of these is Electricity.

Is it? Well, let's see. Still fresh in our minds is the recently published discussion that electricity is responsible for a great many fires and the answering argument that the assertion could not be proved.

Figures are always interesting, even if often confusing. But without figures arguments of this kind might go on indefinitely without getting anywhere.

In the effort to get at some basic facts as to the relation between electricity and fires, statistics of the city of Newark, N. J., for the last five years have been carefully gone over. Newark has a population of half a million people and is the center of a suburban group of another half-million or so. It is not among the 10 largest cities, nor is it among the 10,000 smaller municipalities in the 48 glorious States of our Union, but it is a sort of happy medium, a fair average, a good criterion or whatever else may be necessary in the effort to reach some definite conclusion.

Every fire in Newark is investigated and the records of its Fire Prevention Bureau are of value. Newspaper stories of fires, telephoned and written under stress of time and excitement, frequently give this or that cause, which is later disproved by careful investigation, but never contradicted in print, so that first impressions are lasting. Newspaper clippings of fires are, therefore, often misleading in compilations as to fire causes.

Taken by and large Newark had 9,960 alarms of fires in the years 1916, 1917, 1918, 1919 and 1920. That's an average of about 2,000 alarms annually. Now these were not all fires. In more than one-sixth or one-seventh of the cases there was no fire or, perhaps, a fire without any loss being recorded. The percentage may be even larger than this. It goes without saying that when the fire department is summoned because of a trolley wreck or because someone is caught under an automobile or is drowning in the canal, or there happens to be an ammonia leak, such occurrences should not be listed with actual fires and yet they must stand of record as "alarms."

In looking over these 10,000 alarms, we find a total of 659 "fires" charged to electricity.

The figures look like this:

Year	Number of Alarms	Charged to Electricity
1916	1,842	94
1917	2,007	111
1918	2,136	140
1919	1,926	119
1920	2,049	195
Totals	9,960	659

Of course Mr. Statistician—whether he be anxious to prove electrical fires or to disprove them—will at once take out his pencil and do some calculi. He will reach the conclusion that in 10,000 fires there were electrical fires that averaged .6601 per cent of the total.

But in all fairness to the subject, a further discussion is necessary, and we are led to the following interesting table:

Electrical Fires	1916	1917	1918	1919	1920	Total
Trolley Cars	21	36	65	46	77	245
Automobiles & Garages	17	14	26	27	40	124
Factories	12	14	20	15	17	78
Dwellings	9	11	3	6	13	42
Stores	10	17	2	10	4	43
Street wires	10	18	15	13	20	76
Miscellaneous	15	1	9	2	24	51
Totals	94	111	140	119	195	659

In the list are included, as will be noted, street wires, poles, manholes and other-than-building uses of electricity. It is also well to bear in mind that these figures are more than usually accurate in that there is no "unknown" quantity to be used as a "kicker." In Newark the records show the "unknown" fires in the five-year total of 9,960 alarms to be as follows: 1916, 5; 1917, 11; 1918, 14; 1919, 4, and 1920, 2, which amount to only 36 all told.

And now as to losses due to electrical fires. Too bad it has not been possible to subdivide the losses in groups as to factories, dwellings, etc., but nothing except the bare totals is available. These losses, as compared with the losses totaled from all causes, are as follows:

	Total Losses (All Causes)	Losses Charged Against Electricity
1916	$ 971,686	$167,289
1917	658,809	28,894
1918	2,549,468	208,600
1919	1,039,502	27,859
1920	1,284,160	155,219
Totals	$6,503,625	$687,861

Having furnished the ammunition, I am now willing to let someone else shoot.

Chlorinating System for Tanneries

THE existing method of disinfecting tannery effluent by means of hydrate of lime, while effective for the germs of hoof-and-mouth disease, has been found ineffective for anthrax germs, and the Bureau of Animal Industry has issued emphatic orders that an improved method of disinfection must be provided by tanneries emptying effluent into sewers. Walter S. Wainwright, of Walter Kidde & Co., Inc., gives a solution for the situation in a special tannery issue of *Hide and Leather*. His article, "Economy of Chlorine as a Disinfectant for Tannery Effluent," has also been reprinted by the *Stevens Indicator*.

As a preliminary to the chlorination process, the effluent is collected in trenches and run by gravity into an underground reservoir, which is preferably of specially prepared reinforced concrete, and of sufficient size to hold an entire day's run of effluent. Chlorination begins at the chlorinating control plant, which has panels that can be set to release to the chlorination tank any predetermined hourly weight of chlorine. These panels should be installed in duplicate, to provide for emergencies. In the chlorination tank there should be installed an agitating propeller, driven from without the tank by a motor, and baffling constructed to set up a continuous current.

The level of the tank in relation to the adjacent sewers is an important consideration. If the base of the tank is lower than the sewers, a pump must be provided to empty the tank. Motor-driven centrifugal pumps, with the widest possible passageways, are the best, and should be installed in duplicate, quickly interchangeable. Actual chlorination requires an hour in the reservoir.

Safety Demands Americanization

By L. M. Stowell

Fisher Body Corporation, Detroit, Michigan.

IN my home town in a busy manufacturing State live many Old Country mothers of American-born children. A few days ago one of them heard a shrill scream from the dooryard, and rushing out found her small daughter enveloped in flames. Extinguishing the fire as well as she could, the mother brought the little child into the house where she commenced to apply remedies of an old-time and superstitious age, the first being to cover the raw and charred little body with cow manure. About this time the doctor was on his way, having been called by neighbors. Knowing this and fearing criticism at her crude efforts, the mother than held the agonized child under the cold-water faucet in an attempt to destroy the evidence of her awful work.

Before she finished the doctor arrived, stopped her and promptly ordered the child sent to the nearest hospital. The woman refused, so, applying soothing first-aid remedies and making the child as comfortable as possible, the doctor left to return the following day. At this time, after proper preparation of the wounds, he applied a very modern cure for burns in which a coating of wax is used to protect the sensitive flesh from all outside irritation.

SELF-DETERMINATION IN MEDICAMENTS

After the doctor had finished and left the house, the mother decided it was all wrong and she tore off the hardened wax and applied instead a nearly raw solution of sulpho-naphtol and covered with cotton cloth.

As the wax treatment should not be disturbed for some time the doctor did not return for several days, and when he did return he found the little body raw and bleeding from repeated irritations due to combined penetrating effects of the half-raw sulpho-naphtol and the frequent forceful removals of the coarse bandages. The child was fast weakening, and realizing that he could get no co-operation from the family, the doctor sent a representative of the S. P. C. C. who, upon arriving at the house, was abruptly ordered away.

A WARRANT FOR HOSPITAL CARE

Well, to shorten a long and horrible story, a warrant was issued and served upon the father, requiring him to send the child to the hospital. He refused, saying that "my woman, she the boss of the house." So, having waited a week for the mother's heart to respond to the needs of her little daughter the officers captured the woman who meanwhile had run out the back door with the child, and took both to the hospital. Here everything was done to ease the little sufferer but the flesh was so badly eaten that much of it had to be replaced by the grafting of new flesh. The child is now recovering, but will always be scarred.

Now, what I am getting at is this: The father of this child is a naturalized American citizen and a voter in the town where he has lived for fifteen years. He and his wife are of a country in south central Europe whose people by hundreds of thousands are working in our shops and mills. It is to this type of workman, a minority group, that most of our safety-first education in industry is directed, for if, as father and mother, they will not or cannot care for the health and welfare of their own flesh and blood, how can they be allowed free association with their fellows in the shop?

BANISHMENT OF FATALISM NECESSARY

I say this, and this gruesome illustration is given, solely to show that there is positive and emphatic need of systematic safety education in our shops to protect all workers from the indifference, ignorance, and fatalism of a relatively few in their midst. It is

for this reason that the factory hospitals *demand* for safety's sake that all injuries be at once brought in for treatment. It is for this reason, for the protection of the many from the few, that factory managements so often require and indeed the workers themselves sometimes ask for a physical examination of all prospective employes. It is for this reason that the local shops and safety committees, reinforced and often directed by a national safety-first bureau, are constantly telling us to "cover exposed cutters on machines," wear your goggles," do not spit on the floor," "no smoking," "girls, wear your caps and uniforms," etc., etc.

BOTH PERSONAL AND GENERAL GOOD REQUIRE SAFETY EDUCATION

It is all simply an expression of the old command: "Thou art thy brother's keeper;" those who know are in duty bound to protect and instruct the ignorant for their *own* sakes, while the indifferent and misguided must be shown for the general good.

STOP - LOOK
LISTEN
OBEY THE LAW OR PAY THE PRICE
KILLED 4.350 PERSONS IN FOUR YEARS 1917-20 IN ACCIDENTS AT GRADE CROSSINGS IN THE UNITED STATES
12.750 PERSONS INJURED AT GRADE CROSSINGS IN THE UNITED STATES IN FOUR YEARS 1917-1920

Drawn by F. H. Babcock, Safety Agent, P. & L. E. R. R.

Safety News and Comment

Home Movies and Decorations

AN approved fireproof booth, ventilated to the outside air, and in charge of a licensed operator, is a legal prerequisite to the exhibition of flammable motion picture film, in the home or elsewhere, in New York State. That even toy motion picture machines are subject to this regulation is emphasized in a warning issued by the Bureau of Surveys of the New York Board of Fire Underwriters. The warning states that flammable films are being freely sold in New York City. Another case of *caveat emptor*.

The Fire Underwriters have also issued a warning concerning the increase of hazard incident to Christmas greens and other flammable decorative materials.

Safety on the Roads

SAFETY on the roads will be a subject of special consideration at the session devoted to problems involved in highway traffic during the National Good Roads Show, to be held in the Coliseum, Chicago, January 16-20, 1922. The show will be the thirteenth under the auspices of the American Road Builders' Association. The Portland Cement Association, the Asphalt Association, and the National Association of Paving Brick Manufacturers are co-operating in arrangements for the meeting.

Industrial Accidents in Wisconsin

THE Wisconsin State Department of Engineering in a quarterly report for the third quarter of 1921 registers 3,700 industrial accidents, a decrease of 2,001 from the same period of 1920. The State Industrial Commission investigated 390 accidents during the quarter, and of this 390 found 23 per cent in conjunction with violations of the State safety orders.

More Automobile Accidents

AN increase from 10.6 to 11.6 in the death rate per 100,000 persons exposed to automobile accidents, as computed by the Industrial Department, Metropolitan Life Insurance Company would indicate that 1921 (January-September) is falling below 1920 in public safety work.

Railroad Fatalities Reduced

THE Norfolk & Western Railway has issued a graphic folder in color showing the following reduction of fatal accidents on that railroad from 1912 to 1920, contrasted with the increase in volume of business during the same period:

Year	Volume of Business: Ton-Miles	Total Accidents: Per cent Over 1912	Total Accidents: Persons Killed	Total Accidents: Per cent Under 1912
1912	9,021,204,776	0	229	0
1913	9,883,037,784	10	193	16
1914	9,508,043,496	5	160	30
1915	11,022,466,620	22	177	23
1916	12,828,910,712	42	152	34
1917	13,194,678,631	46	112	51
1918	12,889,279,356	43	144	37
1919	10,591,783,313	17	99	57
1920	11,659,836,023	29	84	63

Promptness Vital with Cancer

THE American Society for the Control of Cancer, acknowledging publicity secured through the article, "Cancer Curable in Early Stage," in the October issue of SAFETY ENGINEERING, states its position on the giving of advice in particular cases:

"The purpose of the American Society for the Control of Cancer is to teach the danger signals of cancer . . . that those afflicted with this disease may be saved by early diagnosis and prompt treatment. It cannot in the very nature of things undertake to recommend particular physicians or types of treatment. . . . Both radium and operation claim a

high percentage of cures among early cases. It is therefore not so much the type of treatment as to lose no time in destroying the growth while it is still in an early stage. One caution is however permissible: Nobody should undergo radium treatment for cancer from the hands of a physician who is not thoroughly familiar with the application of this treatment, nor from one who has an inadequate supply of the mineral for effective use; radium poorly administered or applied in insufficient quantities is likely to do more harm than good."

Course in Industrial Nursing

THE Health Department of the City of New York projects a course of twelve lectures, with field work if desired, to nurses engaged in industry or desiring to enter industrial establishments. Nurses or establishments interested may secure further information by addressing the Acting Supervisor, Division of Industrial Hygiene, Department of Health, New York, N. Y.

Office Safety Display

THE need of safety provisions in office buildings and in the office itself was made the subject of a two-window display by Gregory, Mayer and Thom, Detroit stationers. The *American Stationer and Office Outfitter* says of the exhibit:

One of these windows was made to represent an office after having been gutted by flames. The front glass of this window was made to represent a brick front by pasting paper, painted to represent bricks, over the larger portion of it, leaving an opening in the center to represent the window of the burned office and to give the onlookers an opportunity to view the interior.

Within was a mass of charred timbers, boards and frames and a steel cabinet and two tiers of steel sectional filing cabinets. The charred wood was piled around, against, and on top of the steel cabinets as if the pieces had fallen in those positions as the building burned. A wax figure, clothed in a fireman's waterproof coat and helmet, stood with its back to the spectators, viewing the havoc wrought by the flames.

The other window arranged by this establishment represented an office equipped with a popular make of steel office furniture. This consisted of a large desk with tiers of drawers on each side, a table with small drawers, two chairs, a sectional steel filing cabinet, box files, letter trays, desk lamps, writing materials on the desk and table, waste basket and cuspidor, and fire extinguishers. There were five of the latter, a large one on each side of the room and one on the wall at the rear, and two small ones standing in front of the filing cabinet. Two small rugs covered the floor. Appropriate cards proclaimed their messages of carefulness in the matter of fires and others called attention to the advantages of furnishing one's office with steel furniture and equipment.

For two blocks in each direction from this store, the fire department had painted on the sidewalks the tracks of a pair of huge feet leading to these windows.

It has been suggested that office outfitters throughout the country might well imitate this Detroit firm's displays. Not every outfitter is located where he can conveniently co-operate with a large city fire department, but everyone does carry furnishings that could readily be featured in such a window and by arranging such a display he would be doing good both for his community and for his business.

Specifying Portland Cement

A UNIVERSAL cement specification has been adopted by testing engineers, commercial interests and goverment bureaus in the United States. Based on the same kinds of tests in most cases, 31 other countries have specifications. Twenty of these specifications differ in important details from each other, and all have been summarized in a chart issued by the United States Bureau of Standards. The tests used are for chemical composition, specific gravity, fineness of grinding, setting time, soundness, and tensile and comprehensive strength.

For Uniform Contracting Practice

A CONFERENCE was held in Washington, D. C., December 15, to consider a method of securing more uniform contracting practice by the establishment of standard specifications for engineering work. There was representation from the American Association of State Highway Officials, American Engineering Council, American Institute of Architects, American Railway Engineering Association, American Society of Civil Engineers, American Waterworks Association, Associated General Contractors of America, National Association of Builders' Exchanges, and Western Society of Engineers.

EXHIBITORS AT THE PENNSYLVANIA INDUSTRIAL RELATIONS CONFERENCE, HARRISBURG, OCTOBER 24-27, 1921

In the front row, left to right, are: W. H. Sylvester, Philadelphia; J. P. Lilley, Graphoscope Company, Pittsburgh; Harry E. Peelle, The Peelle Company, Brooklyn; Ed Terry, Safety First Supply Company, Pittsburgh; Unidentified; T. H. S. Cone, Aero Alarm Company, New York; B. Gross, Ad Photoscope Company, Philadelphia; Mascot "Hogging the Picture"; Major J. N. Thomas, Julius King Optical Company, Pittsburgh Branch; Miss F. L. Rusinow, Protecto Safety Appliance Company, Newark; J. P. Maloney, Pyrene Manufacturing Company, New York; F. P. Gardner, Gardner Grate Company, Boston; Miss Detwiler, registrar.

In the second row, left to right: Mr. Lehman, Mine Safety Appliance Company, Philadelphia; Mr. Seagraves, Mine Safety Appliance Company, Pittsburgh; J. H. Wilcox, Norwich Wire Works, Norwich, N. Y.; K. C. Saekman, Prudential Insurance Company, Newark; L. A. Fisher, Central Brass Company, Cleveland; Buell W. Nutt, Safety Equipment Service Company, Cleveland; Unidentified; Unidentified; Mrs. Forrer, registrar.

In the third row, left to right: Mr. Turner, American Atmos Corporation, New York; M. I. Dorfan, Allis-Chalmers Company, New York; A. U. Barnes, Standard Safety Equipment Company, Newark; F. M. Rockwell, Willson Goggles, Inc., Reading; Dwight S. Anderson, *Safety Engineering*, New York; G. J. Leeb, Aero Alarm Company, New York; John S. Spicer, Director of the Exhibit; Mrs. F. M. Rockwell, Reading, Pa.; Miss Luts, registrar.

In the top row, left to right: S. B. Cummings, Graphoscope Service Company, Pittsburgh; Unidentified; Unidentified; Roy Abel, Safety First Supply Company, Pittsburgh.

Steel Company's Exhibit

THE Illinois Steel Company describes in its *South Works Review* its pavilion-exhibit, prepared for the Pageant of Progress, featuring safety measures, as follows:

In the center of the pavilion was a large circular gallery of photographic plates, illuminated on the inside of the case by electric light, showing hundreds of the devices and safeguards designed to protect employes from injury, together with photographs demonstrating kindred activities inaugurated by the company at its plants, such as sanitation, athletics, club life, visiting nurses' work, philanthropy under Goodfellow Club auspices, and Americanization of the foreign-born employes. While these pictures were taken in connection with the Gary Works they could as well be applied to South Works, also to Joliet, as the safety-first mechanics were of the class which become standardized in all the plants of the company.

On counter fixtures around the booth were arranged numerous small accident-prevention articles, life-size or miniature models, which were simple enough to be easily understood by the passing throng, with a little explanation, and appealing to the public eye. Flanking these counters were movable panels on stands, showing photographic reproductions of the various plant activities and welfare of the company. On the walls were shown similar framed pictures, and masks and guards used by men in the steel mill game to guard them from asphyxiation, or burns, and to protect their eyesight.

Activity in "Inland Empire"

SAFETY organizations were established in 38 large industrial plants of eastern Washington and northern Idaho during 1920. Twenty organizations were formed in Spokane and eastern Washington plants. Eighteen organizations were established in Idaho industrial plants.

Dean Cooley Honored by F. A. E. S.

THE Executive Board of the American Engineering Council, Federated American Engineering Societies, has announced the election of Dean Mortimer Elwyn Cooley of the University of Michigan as president of the Council and the F. A. E. S., succeeding Herbert Hoover. Dean Cooley took office at once.

An extensive program is planned by the American Engineering Council under the leadership of Dean Cooley, including a national Department of Public Works, an Inter-Departmental Board on the Standardization of Contracts, the Lampert Patent Office Bill, and the Stanley Senate Bill limiting the tenure of unworked patents granted to aliens. Within the F. A. E. S., a joint committee of nine members to represent the Council and its four founder-societies is empowered to organize a fee-basis engineers' employment service of national scope and local application.

Employment Research and Safety

AN aid to organized research in employment management, industrial relations, training and working conditions has been published in bulletin form by the United States Bureau of Labor Statistics, as the outcome of a survey undertaken at the request of the conference held in 1920 under the auspices of the Engineering Foundation and the National Research Council. This bulletin, "Personal Research Agencies," has distinct treatments of safety work, fatigue, lighting, ventilation and their effects on the output and health of workers, occupational disease and health hazards in the various industries, safety codes and appliances for the prevention of accidents.

No-English and Accidents

THE Portland *Oregonian* thinks that little surprise will be caused by the statement of the Bureau of Industries and Immigration that the chief cause of increase in industrial accidents, of which there were 56,000 more in the United States in 1919 than in 1918, was inability of workers to understand English. Seventy per cent of claimants under the workmen's compensation law, according to this statement, required interpreters to represent them. Some were mentally defective. Thus another incentive is furnished for more complete Americanization of aliens. The reasons why these are more subject than others to the risks of their occupations are that they are unable to understand orders given by foremen, or are unable to read printed instructions, warning signs and similar devices designed for their protection. It is true that in many establishments placards are printed in several languages, but these represent at best an inadequate effort to make the best of a bad situation.

Fire and Accident Prevention

THE third annual meeting of the Ontario Fire Prevention League elected the following officers for the year 1921-1922: honorary president, E. C. Drury; president, Arthur Hewitt, Toronto; vice-presidents, J. M. Watts, London, and G. C. Martin, Hamilton.

G. L. Ball was elected president of the Railway Fire Protection Association for 1921-1922. The other officers are E. A. Ryder, vice-president, and R. R. Hackett, secretary and treasurer.

Accidents in Shipbuilding Plant

DURING 1920 a shipbuilding plant employing an average of 2,670 men had 14 accidents causing permanent disability, 116 causing more than 7 days of lost time, and 78 compensable cases of less than 7 days. Out of 208 accidents causing as much as a day's loss of time, 16 are reported by the shipbuilding engineer of the California Industrial Accident Commission as the results of working machines and hoisting apparatus. Classifying the accidents by cause in *California Safety News* he says:

Objects falling from an elevation, such as bolts, nuts, liners, or tools from off a scaffolding, caused the greatest number of accidents, viz.: 5 permanent, 24 compensable, and 13 non-compensable cases, a total of 42. The next highest number from any one cause is charged

against the handling of material, viz.: 3 permanent, 18 compensable, and 8 non-compensable, a total of 29. Hand tools caused the next largest number of accidents, viz.: 2 permanent, 10 compensable, and 8 non-compensable, a total of 20. Falls of persons from elevations appear next in order, having caused 1 permanent, 13 compensable, and 5 non-compensable, a total of 19.

Indiana Industrial Accidents

THE Indiana State Industrial Board reported for the fiscal year ended September 30, 1921, 34,369 industrial accidents, of which 263 resulted fatally. Six hundred seventeen workmen suffered the loss of some member of the body. Coal miners were injured in 4,851 cases, with 80 deaths.

The report indicates that railroad employes were injured in 3,041 cases, with 18 deaths, automobile industrial employes in 2,309 accidents, with three deaths. Steel industries reported 1,965 accidents and 20 deaths.

Records of the State board indicate that a large percentage of the accidents were caused by the falling of material or machinery.

Eye accidents numbered 2,707.

Safety against Anthrax

BRUSHES made of animal hair in Japan may not be exported, under Japanese regulations first effective September 1, 1921, unless the hair is disinfected at the port office or in a manner approved by the prefectural governor. Infringements and attempts at infringement are both punishable by a fine.

Pneumonia, Diphtheria, Typhoid

THE scope of the safety movement is not at present as wide as public health interests think it should be. According to the *Statistical Bulletin* of the Metropolitan Life Insurance Company:

"There are five times as many deaths from the important preventable diseases as there are from preventable accidents. . . . There is no good reason why the scope of the Safety First campaign should not be broadened to include the saving of life from disease as well as from accident. . . . Not less than one-third of the deaths are clearly preventable if the present facilities of knowledge and of service were availed of by the body of the people. . . . It is well within the province of a Safety First campaign at this time of the year when the lobar pneumonia death rate is increasing, to educate the public to the realization that this disease is the most deadly of the infections. . . . It is well within the function of a Safety First campaign to teach the people that every child who dies of diphtheria dies needlessly; that the Schick test will indicate those who are susceptible to this disease; that inoculation with toxin-antitoxin will prevent a susceptible child from 'taking' diphtheria. Typhoid fever offers a good field for Safety First work. . . . The Safety First movement must widen its scope if it would serve the people as fully as it can."

Tuberculosis and Life Insurance

OF the nearly $47,000,000 disbursed in 1920 by the Metropolitan Life Insurance Company in the payment of death claims, over three-quarters of which was for preventable causes, the largest sum for any one disease, $6,555,927, or 14.3 per cent of the total, was for tuberculosis. Even at that the tuberculous death rate for 1920 was 137.9 per 100,000, the lowest in the history of the company.

"It is our contention that tuberculous disease represents the most hazardous question with which we have to deal in selection," says Dr. Walter B. Metcalf, medical director of the Continental Assurance Company, in *Medical Insurance and Health Conservation.* He also believes "that the hazard is greatly increased by the close association with other lung lesions, that it is also influenced by the very marked effect of other diseases upon the development of tuberculosis, and that certain influencing factors heretofore considered favorable must be weighed carefully before final acceptance . . . that progress is being made toward stamping out this disease, and that the mortality figures that will be compiled from our selection will prove to be favorable to our companies, even if we liberalize in the acceptance of cases giving a history of tuberculous disease, and if we will exclude cases giving a history of pleurisy, asthma or bronchitis, we can safely accept risks showing a wider

range in variation from the standards now in general use."

These contentions have been reached after a questionnaire-investigation to which 76 medical directors of life insurance companies contributed. The statistics show what is coming to be generally admitted, "that the relation of pleurisy and tuberculosis is much more intimate than was formerly believed. . . . We must assume that every case of tuberculous disease which follows an attack of pleurisy is due to the pleurisy, because there is no question but that the underlying cause of the manifest pleurisy was a tuberculous infection."

Typhoid Fever Vanishing

THE *Journal of the American Medical Association* has recently issued its ninth annual survey of the prevalence of typhoid fever in the 68 cities of the United States having a population of more than 100,000. These cities in 1920 had an average of 3.7 deaths in each 100,000 of population, which is a decided decrease from the 1910 average of 19.6 for the 57 of the same cities for which 1910 statistics are available. The two largest cities have rates considerably below the general average, New York's being 2.4, and Chicago's only 1.1. Pittsburgh shows the greatest decrease in rate, for the 1906-1910 annual average in that city was 65, and has been reduced in 1920 to 2.7.

Probably the cause of greatest importance for the remarkable drop in the typhoid fever rate is the continual improvement in the quality of the water supply of American cities. Also, the extensive inoculations against typhoid fever in the army and navy have undoubtedly had a good effect. This is indicated by the much greater drop in the death rate among men than among women, and more especially among men at the ages of 20 to 35.

Metropolitan Life Insurance Company policyholders have, in addition, enjoyed nursing care during sickness and have received instruction through public health literature. Vaccination against typhoid fever has been uniformly urged. The Metropolitan Company claims a greater drop in the death rate among the insured than in the general population.

The history of typhoid fever is a remarkable indication of what may be accomplished if the forces of the community concentrate upon the control of a disease, when the facts of its causation and method of control are known. The reduction of typhoid fever can be repeated in relation to other acute infections.

Unsafe Conditions Corrected

THE Delaware and Hudson Company reports for 1920 a total of 6,240 unsafe conditions corrected, which shows an increase from 5,758 in 1919. The first 4 months of 1921 have 1,970 corrections, at which 1921 would show a decrease from 1920.

Unsafe practices reported corrected in 1919 were 3,257; for 1920, 3,215, and for the first 4 months of 1921, 813. There is indicated a steady decrease from 1919 to date in these figures.

Redmond, Syracuse Manager

THE resignation of Frank E. Morris as manager of the Syracuse Safety Council, December 1, was followed by the entrance of Frank E. Redmond as his successor. Mr. Redmond is the well-known cartoonist, "father of 'Safety Annie.' "

Mr. Morris leaves to become associated with David S. Beyer, vice-president and chief engineer of the Liberty Mutual Insurance Company, Boston.

Equipping Yard Engines for Safety

THE Youngstown Sheet & Tube Company, Youngstown, O., has sent out a questionnaire asking information and advice as to the equipment of yard and road engines with fire-fighting apparatus. At present the equipment used on their broad-gauge engines includes 50 feet of 1½-inch rubber-lined hose, coiled in a sheet iron box, located under the cab. on the fireman's side. A connection is at-

tached to the injector line, and whenever required, hose is attached and injector started. The results are all that could be expected, giving an effective stream, but the deterioration of the hose is found too rapid for reliability.

The questions asked by the safety director in his investigation are:

1. With what fire-extinguishing apparatus are your yard or road engines equipped?
2. What kind of hose do you find best suited for this work, and from whom do you purchase it?
3. On what part of the engine do you carry it when not in use, and what is used to carry it?
4. How do you protect it from the weather?
5. What type nozzle do you use, and from whom do you purchase it?
6. Does the nozzle become overheated from the water?
7. If so, what arrangement have you for a hand hold?

The End of the Man and the Match

AS related by the Boston *Advertiser* in a short poem in prose. Sent to us by a subscriber with the comment that it is exceptionally clear:

This is the Ford that Henri built.

This is the engine that ran the Ford that Henri built.

This is the tank that fed the engine that ran the Ford that Henri built.

This is the gas that leaked from the tank that fed the engine that ran the Ford that Henri built.

This is the man who smelled the gas that leaked from the tank that fed the engine that ran the Ford that Henri built.

This is the match lit by the man who smelled the gas that leaked from the tank that fed the engine that ran the Ford that Henri built.

This is the search with lighted match made by the man who smelled the gas that leaked from the tank that fed the engine that ran the Ford that Henri built.

This is the end of the man and the match and the gas and the leak and the tank and the engine and the Ford that Henri built.

Premature Explosions in Quarries

A RECENT premature explosion in a quarry that resulted in the death of nine men and the injury of several others, was directly traceable to a spark from a steam shovel working under the face directly in front of the hole being loaded. This accident and similar accidents on record indicate the necessity for pointing out the dangers in quarries of explosives being ignited by sparks emitted from steam shovels and locomotives, and making recommendations for greater safety, engineers of the Bureau of Mines say. Mr. Spencer P. Howell, explosives engineer, and Mr. J. E. Crawshaw, explosives testing engineer, of the bureau, unite in making the following recommendations for safety:

1. The general principle should always be followed that workmen should never be allowed at the base of a quarry face within the zone of possible danger from falling rock after the work of loading the hole has begun, and the presence of workmen in the area between the line of holes and the face should be avoided.
2. Before loading is begun, the steam shovel and locomotives should be withdrawn from the face of the quarry to such a distance that under no circumstance could sparks from them be carried to the explosive in the holes or on the ground above or around it, or if such equipment is not removed it should not be operated.
3. If there is any unavoidable danger from sparks or cinders a canopy should be provided which will protect the explosive from flying sparks. A covered hopper may be used for black blasting powder.
4. Where an unexploded charge is uncovered by the steam shovel, operations should cease until all of the explosive has been recovered and removed to a safe distance.
5. Every piece of paper or other inflammable material should be removed from the vicinity where explosives are placed during loading operations.
6. Primers should be kept in a portable metal box with a hinged cover and should not be stored close to the explosive, especially while the holes are being loaded.
7. Unopened boxes of the explosive should not be stored close to the hole being loaded, but should be opened at a distance from it and brought up as needed.

Hazards of Floating Oil on Rivers

IN order to reply to an inquiry received by SAFETY ENGINEERING asking whether official reports are available on the hazards of floating oil on rivers or on fire hazards in oil-burning steamships, also whether special reports were issued concerning the "Pan-Handle State" and the "Granite State" fires, we have ascertained, by inquiry, that the New York Board of Fire Underwriters has issued no detailed report regarding the ship fires mentioned. The "Granite State" fire was caused by

the ignition of floating oil on the river, the oil having been discharged from a break in the pipe line of the Standard Oil Company which crossed the river at 96th street, near the location of the "Granite State" training ship. This oil became ignited and made it difficult to fight the fire which communicated to the ship.

Secretary of Commerce Hoover appeared before the House of Representatives Rivers and Harbors Committee on December 7, and urged immediate legislative steps to prevent the pollution of waters at important harbors by oil discharge, which, he said, is not only destroying fish but proving a tremendous fire hazard and seriously damaging beaches. Industrial communities are paying enormously, in insurance and otherwise, for the pollution of port waters, Mr. Hoover declared.

Extensive consideration has been given by fire underwriters to the hazard of floating oil and the various interests concerned therein, covering fisheries, bird life, bathing beaches, motor-boat interests, shipping, fire and marine insurance.

A report has been issued by the National Board of Fire Underwriters on conditions in the principal harbors in the United States relating to the pollution by oil on water. The New York Board of Fire Underwriters has issued a bulletin concerning the unsatisfactory enforcement of both federal and municipal laws prohibiting the ejection of fuel oil from ships in New York Harbor.

Mine Accident Rates

COPPER mine accidents reported to the United States Bureau of Mines for the year 1920 comprise 128 deaths and 12,042 other injuries. The fatal accident rate for 1920 was 3.43 per 1,000 men employed, a decrease of .11 from the 1919 rate. The non-fatal rate, however, increased from 309.6 in 1919 to 323.07 in 1920.

Of the 128 fatal accidents during the year, 90 occurred underground, 17 in shafts, 15 at open-pit workings, and six in surface shops and yards. At copper mines in Arizona, 45 men were killed, 33 in Montana, 22 in Michigan, and five each in California and in New Mexico.

Of the total of 12,042 non-fatal accidents, 9,386 were underground, 235 in shafts, 951 in stripping operations, and 1,470 in yards and shops. In the number of persons injured, Arizona led the list with 6,199, followed by Michigan with 2,017, Montana 1,937, Utah 521, New Mexico 485, and Nevada 224.

Underground, the principal causes of non-fatal accidents were as follows: 2,449 by falls of rock from roof or wall; 1,243 while loading at working face; 1,221 haulage; 1,031 timber or hand tools; 597 drilling; 273 persons falling down chute, winze, raise, or stope; 230 nails or splinters; 173 run of ore from chute or pocket; 135 explosives; 72 machinery.

In shaft accidents, 50 persons were injured by cages, skips, or buckets, 49 by objects falling down shafts, and 18 by persons falling down the shaft.

Of the injuries at open-pit mines, 127 were caused by hand tools, 83 by falls or slides of rock, 72 by steam shovels, 70 by haulage equipment, 66 by falls of persons, 38 by machinery, and 24 by explosives.

Of those injured at surface shops and yards, 160 were hurt by hand tools, axes, bars, etc., 141 by falls of persons, 112 by machinery, 69 by mine cars or aerial trams, 69 by nails and splinters, 31 by run or fall of ore in or from ore bins, and 19 by railway cars.

Of the principal causes of underground accidents at copper mines, the most notable reduction was in those due to falls of rock from roof or wall, while at open-pit mines the principal decreases were in accidents caused by haulage and by falls or slides of rock or ore. Underground an increase occurred in accidents caused by drilling, and by nails and splinters: at open-pits slight increases occurred in accidents from machinery and hand tools.

COAL-MINE FATALITY RATE HIGHER

During the first six months of 1921, the Bureau of Mines says, there were 969 fatal accidents at coal-mines, a rate of 4.01 per million tons mined in 1921. The rate for the same months of 1920 was 3.63 per million tons mined, although there were 124 more fatalities, the difference being overcome by the larger output in 1920.

Official Proceedings

American Society Safety Engineers

Headquarters 29 West 39th St.
United Engineering Societies Bldg., New York, N. Y.

G. E. Sanford, Pres. C. Van Horn, Treas.
Vice-Presidents: Geo. Oliver Smith and Eckford DeKay

DIRECTORS:

Thos. A. Walsh, Merchants' Shipbldg. Corp. — A. D. Risteen, Travellers' Ins. Co. — W. J. Venning, Ætna Life Ins. Co.
Frank Scott, Hamlin & Co. — Holger Jensen, Maryland Casualty Co. — Geo. B. Muldaur, Underwriters' Laboratories
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Albert S. Regula, Liberty Mutual Ins. Co. — Rowland H. Leveridge, N. J. Dept. of Labor — J. Albert Robinson, Grinnell Co.

Regular Meetings—Fourth Friday of Each Month from September to June at 8 P. M.

DECEMBER MEETING

SUBJECT: Development of Safety in Oxy-Acetylene Welding and Cutting.

Time: December 20 (Tuesday, not Friday), 8 p. m.

Papers: "Safety Engineering as Applied to Oxy-Acetylene Welding and Cutting," by F. J. Napolitan, Research Laboratory, Davis-Bournonville Company; "Development of Protection as It Paralleled the Development of the Oxy-Acetylene Process," by J. I. Banash, Chicago, (discussion invited).

Place: Engineering Societies Building, Room 2.

EXECUTIVE BOARD MEETING

THE regular monthly meeting of the Executive Board was held at the United Engineering Societies Building, 29 West 39th street, New York City, on Friday, November 25, at 3.30 p. m.

The following were present: G. E. Sanford, President; G. O. Smith and E. C. DeKay, Vice-Presidents; C. Van Horn, Treasurer; W. J. Venning, G. T. Fonda, A. D. Risteen, F. Scott and W. E. Welch, Directors; also H. W. Mowery, F. P. Porter, W. E. Crippen and G. S. Wood, Secretary.

MEMBERSHIP DEVELOPMENT COMMITTEE

Mr. Welch and the Secretary reported that nearly 600 letters and booklets had been sent out to presidents of casualty and insurance companies and that another series of booklets and letters were being prepared to follow these if an answer is not received within a reasonable length of time. The Secretary also reported that many inquiries for booklets and application blanks had been received as a result of the advertisement in SAFETY ENGINEERING and the Membership Development Campaign.

ANNUAL MEETING OF THE SOCIETY

President Sanford appointed as a committee to make full arrangements for the annual meeting: G. O. Smith, Chairman, and C. Van Horn, W. J. Venning, William Newell, Herbert Powell and the Secretary. The Assistant Secretary of the American Society of Mechanical Engineers was consulted. It was the opinion that a general round table discussion should be held on the afternoon of the annual meeting, and that the dinner should be held at 7 p. m.

COMMITTEE ON SECTIONS

Mr. G. O. Smith stated that he had found considerable interest in the Society among members in Pittsburgh and vicinity.

CONSTITUTION AND BY-LAWS

Mr. Welch suggested certain amendments to the Constitution and By-Laws to allow a new grade of membership to be known as Student.

FINANCE COMMITTEE

The Secretary reported that a substantial amount was taken in for dues, emblems, etc.

MEMBERSHIP CERTIFICATES

A committee, composed of C. Van Horn, Chairman, and Messrs. Scott and

DeKay, was appointed to take charge of the obtaining of a new stock of Membership Certificates.

NATIONAL SAFETY CODE COMMITTEE

A communication was received from Dr. Lucian W. Chaney, Secretary of the National Safety Code Committee, asking that the American Society of Safety Engineers appoint a delegate and an alternate to represent them on the new National Safety Code Committee to be organized December 1. A motion was made and carried that G. E. Sanford act as delegate, and W. J. Venning as alternate, Dr. A. D. Risteen temporarily taking the chair.

HONORARY MEMBER

It was unanimously agreed that the President write to Mr. Herbert Hoover asking if he would accept honorary membership in the American Society of Safety Engineers in recognition of his services in "Waste in Industry."

VICE-PRESIDENTS

It was the consensus of opinion that the number of Vice-Presidents of the Society be increased from two to four, two of whom should hold office for two years, the third to be elected to hold office for one year, and that two Vice-Presidents be elected annually thereafter for a term of two years.

MEMBERSHIP COMMITTEE

W. E. Crippen reported that a number of applications for membership had been approved by the Executive Board.

The following resignations were accepted by the Executive Board: A. S. Bartholomaei, B. N. Jones, Thos. B. Raymond.

The meeting adjourned at 6 p. m.

G. S. Wood,
Secretary.

PROPOSED A. S. S. E. TEXT BOOK ON SAFETY ENGINEERING

THE Committee on Education believes that in order to prepare a suitable text book which may be accepted as a national standard on the subject of Safety Engineering, it is highly important that this work should be the product of the entire Society. The formulation of this text book should be looked upon as the *big thing*, in which each and every memeber may have a share.

The Committee on Education will be the general board of editors, revising and standardizing the manuscript as received, and in order that it may be a real success every member should contribute along the line of his specialty or in the realm of knowledge in which he is most versed.

In order that the committee may know the resources of our Society, each member who is in a position to give any assistance in the preparation of that text book is requested to communicate with the Chairman of the Committee on Education, giving information as to his particular field of safety work, the branches in which he is particularly interested and whether or not he has ever contributed safety articles to papers or magazines.

J. Albert Robinson,
Chairman, Committee on Education,
189 Washington Street, Canton, Mass.

BOSTON SECTION

A MEETING of the Boston Section of the American Society of Safety Engineers, scheduled for December 15, was postponed until January. C. F. Horan, Hood Rubber Company, Watertown, Mass., is chairman of the committee on arrangements for this section meeting. Announcements and reports of this section will appear in a later number of Safety Engineering.

ELECTRICAL POWER CONTROL

AT the request of the Secretary of the Electrical Safety Conference, M. C. Goodspeed has been appointed to represent the American Society of Safety Engineers in the Sectional Committee on the Safety Code for Electrical Power Control. Mr. Goodspeed is electrical engineer for the General Electric Company at Erie, Pa., and a member of the American Institute of Electrical Engineers.

"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 479 SAFETY "RAZZ" AND "JAZZ."—Some of us in the safety field found out that often humor and well-directed horseplay arouse the co-operation of workers and "sink in" deeper than lectures or rules or threats. Witness the "nut stuff" issued by safety and welfare movements. Far from being of frivolous intent, most of the slap-stick work has a well-planned object. It may be interesting to know that much of the dignified and conservative safety matter never reaches the bulletin boads of an industrial plant, while cartoons are almost sure to be tacked up.

The idea still prevails among some workmen that a man who risks his life is "brave," while a careful fellow often is "kidded," and referred to as an "old woman" or a "sissy." The country is fed up on safety matter to counteract this idea, but the stuff is stilted, too-dignified, top-heavy, strained, and pepless. Let's "razz" 'em for a welcome change.

WHO'S NEXT TO GO?

Safety Pome, Rolled and Chilled

Bust open the gates of the graveyard so gaily,
Dear brother would like to get in.
He works with the germs on the scrap metal daily,
In shoes that are tearably thin.
Our crane floor has Oscar, whose first name is sloppy,
He never knows where he is at.
Some day he'll look up at a beautiful poppy
Because of a helluva bat.
With wind in their horns the white angels are calling
Pat Casey who works with his feet.
Kicks drawheads and switches, and anything stalling,
Pat's coming; get ready, Saint Pete.
My uncle Joe sleeps on his feet 'round machinery,
He's sure to sit down on a sword.
Right soon he'll be boxed like the other sardinery,
And then we won't get his back board.
Our carpenter wants his eternal rest early,
Up ladders he runs like a flare;
He hops over holes and walks planks, Oh how squirrelly,
Just so he can climb the gold stair.
We mention Mike Pappas, whose hands want a flower.
Mike makes our transmission take grips.
But no one can tell him to throw out the power.
Let's hope he'll enjoy his 'round trips.
The Bloody Club's members include the boob chippers
And all who demand to see black.
They won't wear their goggles among the eye rippers,
Until they receive a good smack.
The prize living-dead is the nut who makes speeches
Concerning "this new safety bunk;"
And howls down plant rules, and everywhere preaches.
His brains, what he has, are pure junk.
Some hundreds of women will half-close the shutters
Tomorrow 'cause men wouldn't do
The things they were told. And to you the voice mutters,
Watch out, or the next corpse is
YOU.

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No. 480 GETTING INTEREST IN SAFETY.—As chief engineer of a large manufactory, I had the task of organizing a safety committee wished upon me last November. As we had no experience in this line of work

and also had the usual obstacles to contend with, our way of working may be of interest to other beginners.

It was found that chalk signs on the floor would attract attention when a sign on the wall would not be noticed.

Giant safety footprints at conspicuous corners keep safety in mind.

Signs on the floor called attention to construction work overhead.

During the summer we erected a large brick and steel building to replace an older structure in the center of the factory. The old building was removed and the new building erected without stopping production by our own men, without an accident. The new building is about an acre in extent with a craneway 50 feet high through the middle.

News and items of interest are chalked up on the bulletin boards; also chalk pictures. To make the bulletins more attractive I hit upon the scheme of putting them in rhyme, some of which I enclose.

Defective tools and ladders were exhibited at the gate and a reward offered for the capture of the owner — dead or alive.

Safety inspectors seemed to be pleased with our progress in a short time.

While we do not pretend to have anything like a perfect safety organization, we have had some success. So I send these suggestions hoping they may be useful to others.

A safety sign is very dull
And in disgust you turn away;
But get this firmly in your skull
That Safety First has come to stay.

Some throw cold water on the plan
And some, they bitterly complain;
We know 'tis hard to please each man
But we can try — and try again.

And as you go from place to place
Of Safety First you hear alway;
The other way you turn your face—
That Safety stuff is punk, you say.

With pictures and with verses sweet
We try to sugar-coat the pill,
So when these bulletins you meet
The sight of them won't make you ill.

Without your help we'll surely fail—
You're doing fine, so don't lose heart—
And to the mast our flag we'll nail,
Cry Safety First and do our part.

Safety First has come to stay,
All the knockers are running away,
So get on the job, and you will say,
Safety for me, and start to-day.
We don't keep arms and legs in stock;
If you lose an eye you are out of luck.
Mushroom chissels and all bum tools
Are only found in the hands of fools.
Rickety ladders and rotten ropes
Will do the trick for careless dopes.
Think of Safety all the time,
And don't forget this little rhyme.

"Say it with Flowers."
He did not believe in Safety First.

Eventually SAFETY.
Why not now?

Safety First—
It Satisfies.

Prizes for November Articles

First Prize. No. 477. W. J. Graves, Consulting Engineer, Michigan Mutual Liability Company, Detroit, Mich.

Second Prize. No. 478. Albion M. Soulé, Jr., Safety Engineer, Du Pont Engineering Company, Marine Terminal, Wilmington, Del.

Comments by Members of the November Committee

In recommending that first prize be awarded to the author of Article 477 in the November number of SAFETY ENGINEERING, I have tried to take into consideration the difficulties faced by the author.

My past experience shows that metal stamping presses are largely re-

sponsible for a high accident rate in metal working machines.

Because of the wide range of work and the varied operations for which the metal stamping press is used a universal guard is nearly if not wholly impossible. Generally special guards are designed and used in certain operations. Therefore, when the author shows two different factories in the same line of work in which figures show that the accident frequency is lowest in the plant in which presses are unguarded and the chief safeguard is a careful and conscientious foreman, he shows what safety engineers have always asserted—the need of the safety engineer to maintain a lively interest in the safety-first movement.

I cannot well pass over No. 478 without honorable mention. His method of tabulating accidents should be of value to every safety engineer. I also wish to thank the editor of SAFETY ENGINEERING for the opportunity of acting on this committee. It is helping me to keep up my own interest in the safety-first movement.

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I select Article 477 because it has the keystone to accident prevention work, viz., The Foreman. Statistics of the kind in No. 477 may be O. K. for a safety office record, but mean nothing to the superintendents and foremen. Your foreman is the man to work on. And proper backing by the head of the department is essential.

Accidents in Paper and Pulp Mills

[SAFETY ENGINEERING has received from a large corporation operating a number of paper and pulp mills the letter published below.]

THE general impression that paper and pulp mills are dangerous places in which to work is very often based upon the pioneer days, when machinery was left unguarded and men were very rarely cautioned against the dangers which accompanied their work, in my opinion, as I believe that records kept by the safety departments of the leading pulp and paper mills throughout the country would show them to be comparatively safe places.

Following up the safety records of some of the leading paper companies in Wisconsin, I have observed where they have run several months at a time without a lost-time injury, while employing 800 and 900 men, and while our mills have not established as attractive records as that, they have, at times, done very well. Our injuries, where they have ascended with an alarming rate, have all been due to construction work around our mills, which is hardly chargeable to the paper mills proper. However, they are kept with our other safety records, and at times have made our accident records look rather bad.

An analysis of the first 10 months of the year 1921, during which time there were between 500 and 600 men continuously on the payroll at our largest mill, and when there was a great deal of new machinery being installed, shows that the average number of accidents, that is, those which involved lost-time, was five. None of these were at all serious, nor has there been a fatality in the mill this year, nor for some time before that. At one of our other mills, which employs about 200 men, the average injuries in the mill have been less than one per month, with a number of months not including a lost-time injury. At a third mill, which employs about 150 men continuously, the first 10 months has been completed with four lost-time injuries, the most serious being a broken arm. In none of the mills, which employ about 1,000 men, has a fatality occurred this year, nor for some time previous to that.

The installation of the new machinery in the largest mill was completed during the latter part of the summer and the re-

(*Continued on page* 289)

Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Safe construction, prompt fire alarms and adequate fire protection, private and municipal—these lessons stand out when the stories of fires are told. Safe construction means sound building laws, scientific planning of exits and the use of such approved building materials as hollow tile, protected steel, terra cotta, reinforced concrete, common brick, wired glass, fire doors, fire shutters, fire walls, etc. Prompt fire alarms are provided by approved signaling systems, connected with central stations or municipal fire headquarters, and by watchmen who are checked up by watchmen's clocks. Adequate fire protection, especially in industrial plants, means the installation of approved portable fire extinguishers, automatic sprinklers, trained fire brigades, etc.

DWELLINGS, PALATIAL

May 12, 1920. Doylestown, Pa. "Rosscommon," country home of Mrs. George Ross, Linden avenue. One 3-story building partly destroyed. Walls, frame. Floors, wood. Roof, tin. Cause, candle igniting curtain. Fire started in attic. Discovered by an occupant. Alarm, telephone. Duration, about 2 hours. Fire was favored by frame building. Private fire apparatus present, but not specified; other details not reported to SAFETY ENGINEERING. Valuable papers were destroyed.

March 15, 1920. Naperville, Ill. "Heatherton," home of Judge John S. Goodwin, Chicago avenue. One 3-story building destroyed. Walls, brick. Floors, cement and wood. Roof, shingle. Cause, unknown. Fire started in breakfast room. Discovered by passerby at about 1.30 a. m. Alarm, telephone. Duration, 9 hours. Stopped at first door. Fire was favored by shingle roof and fire spread between all partitions. Private fire apparatus, none. Persons in building, 3 (in basement). Killed, none. Injured, none. Value of building and contents, $100,000. Property loss, $70,000.

February 13, 1920. Greenwich, Conn. Dwelling of John H. Flagler, North street. One 2½-story building destroyed. Walls, plaster. Floors, wood. Roof, tile. Cause, furnace pipe broke from rust. Fire started in cellar. Discovered by men working on organ at about 2.30 p. m. Alarm, telephone. Duration, 7 hours. Stopped at foundation. Firemen handicapped by 2½ hours' delay in reporting, deep snow, and no water. Private fire apparatus, small pumper, but no water. Persons in building, 2. Killed, none. Injured, none. Means of escape, not reported. Value of building and contents, $150,000 or more. Property loss, unknown.

January 27, 1920. Philadelphia, Pa. Jeanes mansion, Fox Chase, Hasbrook avenue, below Oxford pike. One 2½-story building destroyed. Walls, stone. Floors, wood. Roof, slate. Cause, overheated stove. Fire started in first floor front room. Discovered by occupant at about 1.13 p. m. Alarm, telegraph. Duration, 5 hours. Stopped at roof. Killed, none. Injured, none. Further details not reported to SAFETY ENGINEERING.

DEPARTMENT STORES

June 20, 1921. Mammoth Springs, Ark. Spurlock & Wellers' department store. Drygoods, millinery, grocery, harness and hardware. Two 1-story buildings destroyed. Walls, stone. Floors, wood. Roofs, tin. Cause, set on fire by unknown persons. Fire started in drygoods department. Discovered by telephone operator at about 1 p. m. Alarm, telephone. Duration, 1½ hours. Stopped when buildings burned down. Fire was retarded by construction of buildings. No Fire Department. Private fire apparatus, only buckets. Persons in building, none. Value of buildings and contents, $75,000.

February 17, 1921. Darlington, S. C. A. Hymans' department store, Public Square, East, general merchandise. One 1-story building damaged. Walls, brick. Floors, wood. Roof, tin. Cause, unknown. Fire started in center of store between ceiling and roof. Discovered by policeman at about 1 a. m. Alarm, Gamewell system. Duration, 4 hours. Stopped at same building by use of 9 streams. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, none. Means of escape, doors. Value of building and contents, about $90,000. Property loss not reported to SAFETY ENGINEERING. Papers were protected.

February 16, 1921. Saskatoon, Sask. Cahill Block, Department and other stores on first floor, apartments on second and third. One 3-story building destroyed. Walls, brick. Floors, frame. Roofs, frame, tar and gravel. Cause, unknown. Fire started in basement. Discovered by tenants on third floor who saw smoke coming through skirt boards at about 1.40 a. m. Alarm, street boxes. Duration, 2 hours. Stopped when building was completely destroyed. Fire was greatly favored by construction of building. Firemen handicapped by intense cold weather and a high wind. Private fire apparatus, none. Persons in building, 115. Killed, none. Injured, none. Means of escape, 2 interior stairways, and 1 outside fire escape. Value of building and contents, $244,398. Property loss, $224,398. Papers were partly lost.

January 12, 1921. Rochester, N. Y. McAlpine-Bullock department store, 116-118 State street. One 4-story building damaged. Walls, brick. Floors, wood. Cause, unknown. Fire started in basement. Discovered by employes at about 5.48 p. m. Alarm, telephone, Gamewell system. Duration, 1½ hours. Stopped at first floor. Fire was favored by construction of building. Private fire apparatus, small chemicals. Persons in building not reported. Killed, none. Injured, none. Means of escape, adequate. Value of building and contents and property loss not reported to SAFETY ENGINEERING.

January 11, 1921. Lexington, Ky. Wolf, Wile & Company, 322-324 W. Main street. Department and clothing store. One 3-story building destroyed and 2 others damaged. Walls, brick (partly). Floors, wood. Roof, gravel. Cause, unknown. Fire started in basement. Discovered by employes at about 10 a. m. Alarm, telephone. Duration, 4 hours. Stopped at adjoining buildings. Fire was favored by unprotected openings. Firemen handicapped by iron grating in rear. Private fire apparatus, small chemical extinguishers. Persons in building, 100. Killed, none. Injured, none. Means of escape, fire escapes and stairways. Value of building and contents, $1,000,000. Property loss, $555,000. Papers were protected.

November 13. 1920. Sacramento, Calif. Nathan department store, 604-608 J and 1011-1015 Sixth street. One 3-story building destroyed. Walls, brick. Floors, wood. Roof, tar and gravel. Cause, rubbish. Fire started in basement near elevator shaft. Discovered by smoke from basement by a policeman at about 12.42 a. m. Alarm, box. Duration, 5 hours; under control in 1 hour. Stopped at first floor, after mushrooming at top, where there was no outlet. Fire was favored by construction of building. Firemen handicapped by delay in receiving alarm. Private fire apparatus, none. Persons in building, 2. Killed, none. Injured, 3. Means of escape, iron fire escapes. Value of building and contents, $505,000. Property loss, $68,500. Papers were protected.

September 27, 1920. Orangeburg, S. C. Tyler Brothers Company, 13 West Russell street. Department store. One 2-story building partly destroyed. Walls, 18-in. brick. Floors, sub-floors. Roof, tin. Cause, high tension current. Fire started in elevator shaft. Discovered by person in rear of the store at about 6.50 a. m. Alarm, street box. Duration, 2 hours, 40 minutes. Stopped at rear of store. Fire was retarded by good fire walls and metal roof. Private fire apparatus, none. Persons in building, 15. Killed, none. Injured, none. Means of escape, doorways. Value of building and contents, $180,000. Property loss, about $10,000.

September 24, 1920. Lima, O. Leader department store, 141-145 N. Main street. Dry-

(*Continued from page 287*)

sult was that in September there were only four injuries within the mill, and in October not a lost-time injury was recorded. The number employed during that time was about 525 men.

We are not under the impression that these records are startling, or even as good as some mills have established. However, we do not make any attempt to find something for a man to work at merely to keep our records attractive, and if a man is not able to do a day's work he is kept at home until he is. I have seen cases in other mills where the safety department brought men into the mill and had him at some seemingly ridiculous job merely to keep the lost-time injury record down.

We feel that our mills are not dangerous to work in and believe that our safety department is functioning. This, we believe, is revealed by a study of the severity of the accidents which occur in our mills, none of them being as serious as they were in the days before safety work was attempted.

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goods, clothing, home furnishings, toys, etc. One 3-story building damaged. Walls, brick. Floors, wood. Roof, gravel. Cause, extension light left burning with current turned on. Fire started in basement. Discovered by janitor at about 4 a. m. Alarm, telephone. Duration, 10 hours. Stopped at first floor. Fire was favored by partitions in basement which prevented firemen from reaching main source of fire. Firemen handicapped by lack of smoke helmets. The dense smoke from burning Christmas stock drove firemen from basement many times. Private fire apparatus, 3 or 4 3-gal. chemical fire extinguishers on each floor. Persons in building, 1. Killed, none. Injured, 8 (7 firemen and 1 policeman). Value of buildings and contents, $501,800. Property loss, $215,719.

April 19, 1920. Folsom City, Cal. Guy Butler's drygoods and shoe stores. One 1-story building destroyed. Walls, wood. Floors, wood. Roof, shingle. Cause, unknown. Fire started in rear of store. Discovered by persons on street about 12.45 a. m. Alarm, fire bell on tower. Duration, 1 hour. Stopped after building was entirely burned. Fire was favored of wooden construction of building. Private fire apparatus, none. Volunteer Fire Department had 3 hand hose carts, 1,500 feet 2½-inch fire hose. Persons in building, none. Value of building and contents not reported to SAFETY ENGINEERING. Property loss, $3,000.

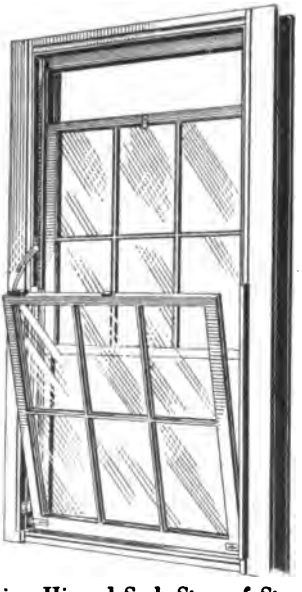
Materials, Apparatus, Processes

In This Department Appear Review-Articles on Products Which Conserve Life and Property. This Information Is Secured Largely from Manufacturers. We Accept No Payment for Its Publication.

SAFE WINDOWS

Until recently little progress was made in the safeguarding of the ordinary double-hung window used in over 90 per cent of the buildings in the United States. The balance are windows of the hinged and pivoted types, made for those who fear they cannot obtain enough ventilation with the ordinary 50 per cent opening, although this apparent gain is accompanied by such disadvantages as greater space, leakiness, etc.

However, ample ventilation can be secured if the ordinary double-hung window is opened the same amount at top as at bottom, to allow spent air to escape at the highest level while fresh cool air is admitted at the bottom. But the opening of the lower sash often creates an unpleasant draft which interferes with the comfort, health and work of the persons in the room. The result is that, during cold weather especially, many people in offices and shops have to keep their windows closed, and work all day in a dry, stuffy atmosphere. Everybody knows that this is injurious to health and lowers personal efficiency.



Showing Hinged Sash Stop of Standard Comfort Window

The Standard Comfort Window Corporation, 426 Broome street, New York, has developed simple patented devices applicable to new and old double-hung windows, whereby positively guided and perfectly controllable ventilation is obtained without draft. All that is necessary is to cut and hinge the lower half of sash stop on each side of window, open it like a book and tilt the lower sash inward as shown by the accompanying illustration, keeping the sash in place by means of a telescopic steel arm. Two adjustable pivot bolts at base hold the sash down against the upward pull of the sash weights.

By simply attaching the usual pulley chains to the lower instead of the upper corners, each sash can be turned outside in (reversed) and cleaned entire from the inside without the slightest discomfort or danger. The fact that builders of apartment houses even 14 stories high are not held to make any provision for preventing accidents due to exposure on the outside of a building when cleaning or repairing windows proves that safety engineering is still an unknown quantity with many architects and owners.

To provide for moving either sash up and down in the usual way, combination metal guides and weatherstrips are provided engaging the face of sash at right angle to the glass. These do away with endwise friction and permit sliding the sashes without effort, thus eliminating accidents. In addition the weatherstrips effectively keep out rain and cold wind and thus save heat and fuel in winter. In brief, the devices named serve to convert an otherwise defective and unsafe window into a Comfort Window meeting every requirement that can reasonably be made of a completely safe and sane window. A 12-page booklet giving all necessary information is being distributed by the makers of the window.

BULLARD FIRM IN LOS ANGELES

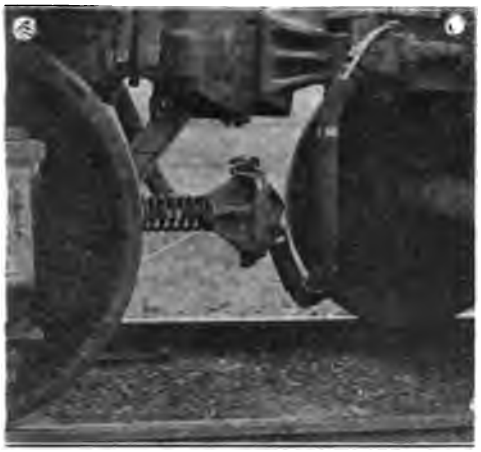
W. D. Edwards, until recently in charge of safety engineering work for the Moore Shipyards, is now representing the E. D. Bullard firm in Los Angeles and southern California. The Los Angeles office has been reorganized, and is now prepared to sell safety service to the southern part of the State.

HOSE CONNECTORS FOR RAILWAY CARS

An automatic connector has been placed on the market by the American Automatic Connector Company, 235 Railway Exchange Building, Chicago, to automatically connect air, steam and signal hose on railway cars.

The device is simple in construction, having but six parts. It weighs 50 lbs., and may be easily applied to present couplers.

The connector as applied to cars will mean an appreciable saving in time, while conserving hose, gaskets and air compressors and reducing the cost of brake-pipe maintenance.



American Automatic Hose Connector

The American Automatic Connector Company has this device on 12 roads for test purposes. All speak very highly of it and recognize in it a safety-first device of prime importance. It reduces the danger of accident to trainmen who are required to connect and disconnect rubber hose between cars. Hundreds are killed and injured annually while coupling and uncoupling hose under the old method.

It also has an interchangeable feature by which connections can be quickly made with cars not equipped with this particular device.

NEW CHEMICAL COMPOUND FREEZE-PROOF

A new freeze-proofing chemical compound called "Chromine," for automobile radiators, has been patented and placed on the market by the Pyrene Manufacturing Company, manufacturers of the Pyrene Fire Extinguisher. Chemists and scientific bureaus to whom it has been submitted for tests vouch for the claim of the manufacturers that it has no appreciable effect on the metal and rubber parts of an automobile cooling system, and that it even eliminates the corrosion that occurs when plain water is used. Experiments made at the Brooklyn Polytechnic Institute, covering iron, brass and solder, brought the conclusion that the rusting of iron is almost absolutely prevented, and the corrosion of brass solder lowered very much below that occurring with water. Experiments at the Electrical Testing Laboratories, New York, found that the submersion for extended periods of brass, aluminum, iron, tin, and solder produced no appreciable electrolytic or corrosive effect.

GUARD MATERIALS NOT WIRE ONLY

The Norwich Wire Works, Inc., Norwich, N. Y., is now making guarding equipment of any material that best suits the conditions.

The company is not confining itself to wire mesh alone, but is also making use of expanded metal, perforated metal and sheet metal. Of course, this firm always expects to continue making wire guards in those instances in which wire is the most desirable material.

CUTLER-HAMMER CATALOG

"Safest in the World" has been adopted as the advertising slogan of the Cutler-Hammer Manufacturing Company, printing equipment engineers. The new catalog of this firm uses the safety motif as its central idea, featuring this as "the outstanding characteristic of the Cutler-Hammer System."

NEW McNUTT CAN

A standardized safety bench can for use as a container of gasolene when required to be constantly available in industrial uses has been perfected by W. H. McNutt, 83 Chambers street, New York City.

The protective feature, which entirely eliminates the fire hazard, is provided by a hermetically sealed vacuum float on the top of which is a screen of fine mesh. Through the center of this float is a small opening by means of which the gasolene below the float is forced upward when pressure is applied to submerge this part of the device. The float rides on the surface of the gasolene until slight force is applied by means of a sponge or cloth to absorb the gasolene.

All parts are removable so the can is ren-

McNutt Safety Gasolene Container

dered easy to clean. It may be sealed in such manner that employes cannot remove the parts without the knowledge of the employer, thus solving the problem of overcoming the disinclination many employes feel towards using safety apparatus.

The following report of tests conducted on this can was made by the Factory Mutual Laboratories:

"The can was filled with one quart of gasoline, which caused the float to rise to the top. The surface of the liquid was about ⅛ inch below the screen.

"A lighted match was applied to the can and the vapor ignited. The flame rose nearly 2 feet and continued to burn for a period of 37 seconds. This test was repeated several times, the float being depressed and the vapor being allowed to collect between each test; in no case did the flame last longer than one minute.

"A match was then applied and after a few seconds the cover was closed. The fire was immediately extinguished. The test was repeated a number of times with the same result. The paint around the top of the can was scorched, but no other injuries were noted.

"The stability of the can was tested by pushing it forcibly near the top. The center of gravity is low enough to prevent overturning under all probable conditions of service."

The same can is used in handling rubber cement, where the highly flammable solvent for rubber makes the manufacture of some kinds of rubber goods extra-hazardous unless great precaution is taken.

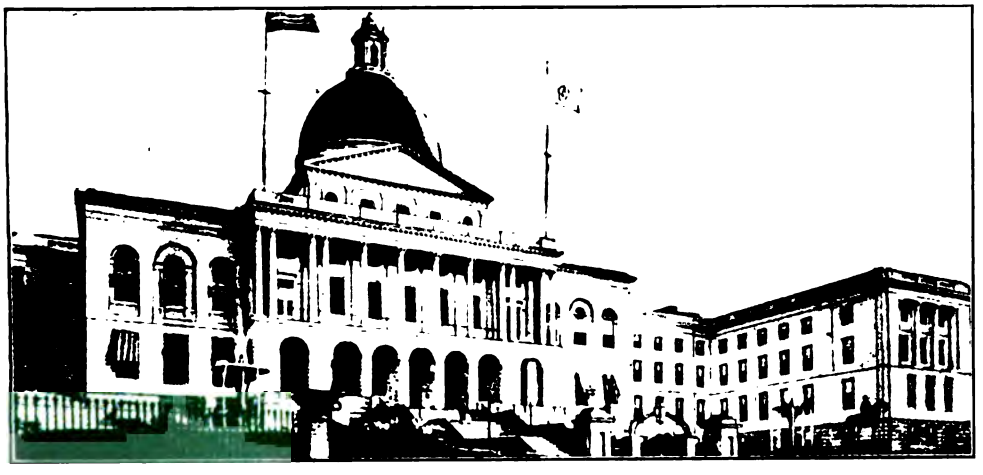
The capacity of the can is a pint and a half of liquid.

All parts are copper and cannot corrode.

Exhibits at the Harrisburg Industrial Conference: Views of Aisles

¶ A WELCOME to BOSTON

Is Extended by the Manufacturers of Safety Appliances and Materials Represented in This Green Bordered Section



State House, Beacon Hill, Where Meetings Are to Be Held

Delegates to the

10th Annual Safety Congress

of

The National Safety Council

Are Invited to Visit the Establishments of the Advertisers in This Section

THE LATCH STRING IS OUT

A Glimpse of Boston

WHILE the visitors at Boston from cities such as Cleveland and Chicago are prone to contrast the crooked streets and narrow alleys of the old part of the town with their broad, straight avenues, nevertheless the people of the Hub City are well known for their urbanity to strangers, and their ever-willingness to direct them how to get to their destinations.

Furthermore, the directions given to the visitor show an astonishingly high percentage of correctness in contrast with the free and easy way in which a New Yorker or a "Pittsburglar" will often waive his hand in the general direction that the inquirer should take. Or, perhaps more frequently, he answers the question not at all.

Boston has a population of more than 800,000 and is the fifth city in the United States. The city and its immediate environs contains a population of 1,900,000. The Metropolitan District contains 40 cities and towns, each having its own local government, though joining together on matters of common interest such as parks and water supply.

A CITY OF SUBURBS

Boston has many suburbs. It is a town of towns. Cambridge and Watertown, not to mention a dozen others, are separate legal provinces, though really an integral part of the city. Senator Henry Cabot Lodge has his home in one of these self-governing villages, a peninsula in the Charles River named Nahant. For many years he has been elected and re-elected moderator of the "town meeting," and even today returns on necessary occasions from his seat in the Senate to preside over the fugitive debates of his neighbors.

There are no fat people in Boston. And nobody is in a hurry. Everyone carries a bag, which contains the play or novel on which he may happen to be working. On entering a "tram" the Bostonian ensconces himself beneath a sign which reads, "4 seats" or "17 seats," as the case may be. There is an element of definite certainty in this that is very pleasing to the stranger.

"PREPAYMENT CARS"

The traveller finds no pay-as-you-enter cars in Boston. They are labelled "Prepayment Cars"—which everyone will concede is better English.

Every time you turn a corner—which is many times a day—you bump into an historical fact.

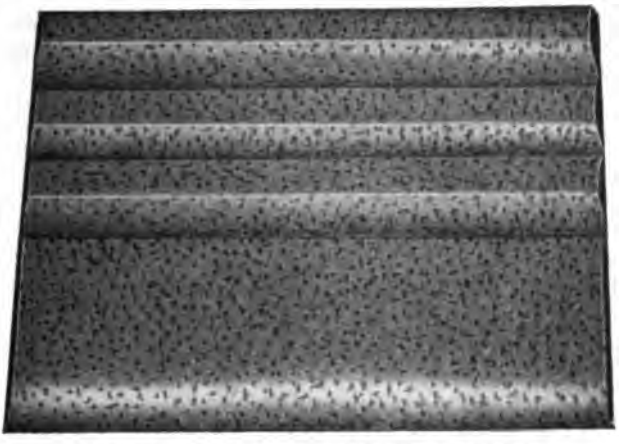
After wandering about the city a while, viewing Old North Church, where Paul Revere hung his lanterns —perhaps climbing up Bunker Hill Monument, the first stone of which was laid by Daniel Webster, who eighteen years later dedicated it at completion—after this sort of thing for a day or two, which is as common in Boston as cobblestones, well——

You begin to think that Abraham Lincoln was quite a contemporary of yours!

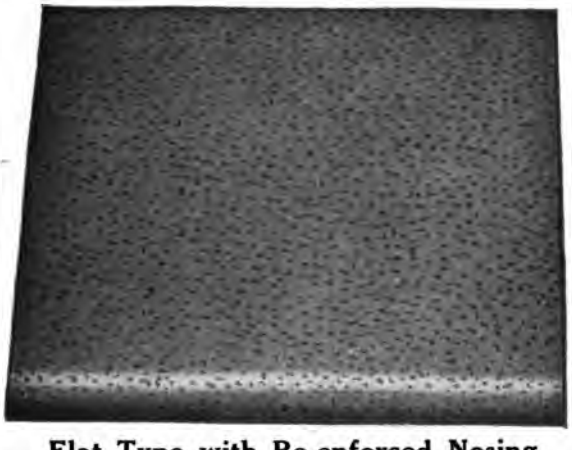
It was in a spirit of benevolent facetiousness, so to speak, that some wit remarked: "Boston is not a city—it is a state of mind."

So sacred is precedent in Boston that even today when the trees in the center of Louisberg Square are trimmed and lopped off, the wood is divided into parcels and evenly distributed for fireplace burning among the adjoining property owners.

GRIT FROM TOP TO BASE



Corrugated Type with Lip Nosing



Flat Type with Re-enforced Nosing

UNIVERSAL TREADS
Are Grit All the Way Through

Remember, in purchasing anti-slip treads, the service you expect them to render after several million feet have scraped them.

Cross Section Showing Depth of Alundum

For one-eighth of an inch the alundum permeates the metal, so it lasts literally as long as the tread itself. All treads are galvanized and non-rusting.

UNIVERSAL SAFETY TREAD CO.

40 Court Street **BOSTON, MASS.**

POINTS OF INTEREST IN BOSTON

Public Library at Copely Square. Take Boylston street car. On this journey you may also visit Trinity Church, made famous by Phillips Brooks. In this library, on the walls of the great stairway, are the celebrated floating figures by Puvis de Chevannes—leading the way to the mural decorations of Edwan Abbeys' "Search for the Holy Grail," and John Sargent's "Holy Apostles."

Bunker Hill Monument stands on Breed's Hill where the battle was actually fought. But the monument still bears its name from the military orders given to the soldiers ordered to take and hold it. It is reached through Monument avenue from Main street.

Old North Church is on Salem street. Here Paul Revere hung his famous lanterns. Any pedestrain encountered in the vicinity of this Church who can speak English (it is an Italian section) will be glad to show the visitor the way around the corner, two or three blocks to the reconstructed home of Paul Revere.

It is interesting to note in this connection that the glistening dome of the State Capitol on Beacon Hill, where the meetings of the Tenth Annual Congress are to be held, still bears some of the original gold-leaf placed there by Paul Revere himself. Revere was a "handy" man and jack-of-all trades, and was almost everything in a small way from an engraver and jeweller, to a dentist. During his lifetime he was not celebrated, and was unable to gain a creditable position in the Continental Army during the Revolutionary War.

In Old South Church is to be seen the first bust of George Washington ever modeled. It stands to the right of the pulpit and was executed fifteen years after the death of the first president of the United States.

Faneuil Hall is not far from the State House through Exchange street. Though burned in 1762, it was immediately rebuilt, and as it is to be seen today, it dates from 1805. The oldest military organization in the country has its headquarters here on the upper floors, the "Ancient & Honorable Artillery Company," organized in 1637. The museum in Faneuil Hall contains probably more relics of patriotic interest than can be found in any other place in Boston. The first flag of the Artillery Company used in 1663 is there today.

Boston Common, on the edge of which the State House stands, has existed as long as the city itself. Ralph Waldo Emerson, whose widowed mother lived close at hand, used to take her cow to this pasture, and Alexander Hamilton once lived almost by the side of the present State House, and in the full regalia of his mani-colored garments, was wont to parade the avenue in front of his house. In fact, the records show that Hamilton was once arrested by a village constable for walking up and down in front of his house opposite the Common on Sunday.

The Boston Athenaeum at the beginning of Beacon street gathers a great deal of material of historical interest and contains a semi-private library.

At the terminal of the Forest Hills elevated cars, those interested in horticulture may make a profitable visit to the Arnold Arboretum, the first agricultural school of Harvard College, which has the best, as well as the most extensive tree meuseum in the world.

A bus of the Royal Blue Line will take the visitor across the Charles River where he may see the Technological Institute, Harvard College and Radcliffe. Farther out is to be found the Old Colonial yellow-colored homes of Longfellow and Lowell.

Still more into the country are the residences of Emerson, Thoreau, Louisa M. Alcott and Hawthorne.

Slipped—But—

Tremont Bldg.,
Boston

Telephone
Haymarket 0636

Caught!

Why didn't this man sustain a serious injury, suffering great pain, losing time from his work, and leaving an unproductive unit in the shop? The reason is that this Punch Press was equipped with

STIER'S AUTOMATIC SAFETY GUARD

Fig. 1

When the Guard is as shown in Fig. 1 it is open and ready for feeding. It is easily adjusted up or down, in or out, so as not to interfere with the feeding or setting of the die. But it cannot operate until the Guard reaches the position shown in Fig. 2. Any obstruction between the fork and shield of the Guard **prevents the release of the clutch.**

Fig. 2

THE STIER'S CORPORATION

5 East 16th St., New York **Tremont Bldg., Boston. Telephone Haymarket 0636**

PLACES OF AMUSEMENT

American League, Fenway Park.
Arlington, 419 Tremont St.
Bijou Dream, 543 Washington St.
Boston, 539 Washington St.
Boston Opera House, Huntington Ave.
Colonial, 100 Boylston St.
Copley, 186 Dartmouth St.
Hollis Street, Hollis St.
Keith's, 545 Washington St.
Majestic, 217 Tremont St.
National League, Braves' Field, Allston
Orpheum, 413 Washington St.
Park, 619 Washington St.
Park Square, Providence St.
Plymouth, 129 Eliot St.
Shubert, 265 Tremont St.
Symphony Hall, 251 Huntington Ave.
Tremont, 176 Tremont St.
Wilbur, 250 Tremont St.

HOTELS

Adams, 553 Washington St.
American House, 56 Hanover St.
Avery, 24 Avery St.
Beacon Chambers (men), 19 Myrtle St.
Bellevue, 21 Beacon St.
Brunswick, Boylston & Clarendon Sts.
Buckminster, 645 Beacon St.
Commonwealth, Bowdoin St.
Copley-Plaza, Copley Sq.
Copley Square, 49 Huntington Ave.
Crawford, Scollay Sq.
Essex, 695 Atlantic Ave.
Franklin Square (women), E. Newton St.
Lenox, Boylston & Exeter Sts.
Oxford, 40 Huntington Ave.
Parker House, Tremont & School Sts.
Puritan, 390 Commonwealth Ave.
Quincy, 47 Brattle St.
Somerset, Commonwealth Ave. & Charlesgate.
Thorndike, 234 Boylston St.
Touraine, Tremont & Boylston Sts.
United States, 90 Beach St.
Vendome, Commonwealth Ave. & Dartmouth St.
Victoria, Dartmouth & Newbury Sts.
Westminster, Copley Sq.
Young's, Court St.

Fire Alarm Systems

A cordial invitation is extended to every delegate to the Tenth Annual Safety Congress to visit the plant of

The Holtzer-Cabot Electric Co.

If you haven't time to call, write or telephone for the new Fire Alarm Bulletin just off the press. This illustrated booklet gives full and detailed information on a Fire Alarm System for schools, factories, hotels, warehouses, yards, etc., etc.

Telephone Jamaica 2600 and the bulletin will be at your hotel next morning. Do not leave Boston without taking a copy of this valuable booklet with you.

THE HOLTZER-CABOT ELECTRIC CO.

125 AMORY STREET BOSTON, MASS.

Manufacturers of Signaling Systems

Angell Safety Elevator Locks

The Only Lock Approved by Underwriters' Laboratories

CALL AND SEE US WHILE IN BOSTON

For All Kinds and Makes of Elevators

EST. Angell 1889

SHIPPER ROPE LOCK EXPERTS

No. 1 Freight Lock Head

ANGELL ELEVATOR LOCK CO.

370 Atlantic Avenue **BOSTON, MASS.**

EIGHT YEARS OF SAVING HUMAN LIVES

an enviable record has been established by the now over 7,000 users.

Chicago Fire Dept., with ten Lungmotors, saved 208 lives in 1920

IN CASES OF

Asphyxiation from smoke, gas-fumes, electric shock, apparent drowning, collapse during anesthesia, asphyxia at birth, strangulation, etc.

41 lives have been saved in Great Falls, Mont., by the Lungmotor.

3 users alone have over $100,000 invested in Lungmotors. It Pays Big.

More Lungmotors were installed in 1921 to date than any similar period

40% of these installations were orders for MORE LUNGMOTORS from those who are saving lives that otherwise might be lost.

All because the Lungmotor is correct physiologically and mechanically. Because it does save lives. It is simple—safe and always ready.

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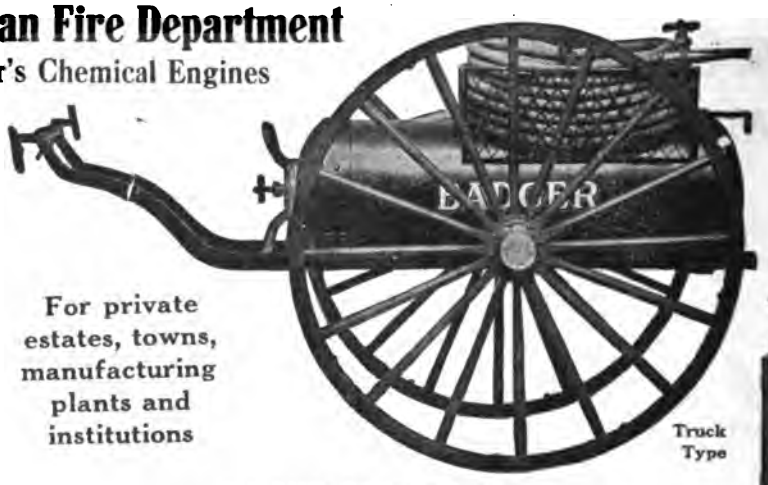
Special Literature on Drowning, Electric Shock and Asphyxiation cheerfully mailed without obligation.

LUNGMOTOR COMPANY **711X Boylston St., Boston, Mass.**

A One Man Fire Department

Badger's Chemical Engines



Badger's
2½ Gallon
Extinguisher

For private estates, towns, manufacturing plants and institutions

Truck Type

Badger's
One Quart
Extinguisher

ALL BADGER'S PRODUCTS
Examined and Tested by Underwriters' Laboratories, Inc., and "APPROVED FOR USE."

MANUFACTURED BY

BADGER FIRE EXTINGUISHER CO.

175 PORTLAND ST., BOSTON, MASS.

New York Office: 123 William St. 424-440 Howard St., San Francisco

Howard Watchman Clocks

SELECTED BY TIMEKEEPING AND ELECTRICAL EXPERTS

Plant of the Waltham Watch Company

The Waltham Watch Co. has installed our watchman clock system and the General Electric Co. had us build them a special type of watchman clock.

These two installations indicate our system is dependable from both the timekeeping and mechanical or electrical standpoints.

E. HOWARD CLOCK CO.

**371 Washington St.
BOSTON, MASS.**

Safety Engineering Magazine of Safety

VOL. XLI. No. 1 JANUARY, 1921 25 CENTS

F. A. Hardy & Co., Safety Department

Announces—the latest additions to its Safety Family

Everything For Safety

THE HARDY GEM RESPIRATOR

Rubber or Leather. Light, Durable, Adjustable, Comfortable and Efficient. Aluminum Nose Cap—Interchangeable filter pads.

The Perfect Respirator

Prices: Rubber, $1.50 each. Leather, $1.00 each. Discount in quantities.

All parts are interchangeable. Price **$10.00 per dozen, discounts** in quantities.

Hardy No. 711 Wide Vision Goggle

Rubber binding — elastic headband—clear or amber lenses.

Especially applicable for caustic-dust chemical or light grinding operation.

HARCO LINEMEN'S BLANKET

(Patent Pending—Trade mark Registered)

A safety Blanket for Electrical uses: 36" square with fabric insertion and beaded edges. Weight 6 lbs. Tested and guaranteed to 20,000 volts.

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F. A. Hardy & Company—Safety Department—Chicago

New York Atlanta Dallas San Francisco Denver St. Paul

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ACCIDENT PREVENTION SERVICE IS ONE OF THE MANY THINGS WHICH MAKE ÆTNA WORKMEN'S COMPENSATION INSURANCE THE MOST VALUABLE.

Ætna Life Insurance Company
The Ætna Casualty & Surety Co.

Hartford, Connecticut

Safety Engineering
Magazine of Safety

VOL. XLI. No. 2 FEBRUARY, 1921 25 CENTS

Announcement

While F. A. Hardy & Company have retired from the wholesale optical business in New York, we are pleased to announce that our Safety Department will continue to be represented by Mr. A. U. Barnes, who will maintain permanent headquarters there, and we will welcome the opportunity to serve our eastern customers the same as has been our policy in the past. Hereafter shipments for industrial goggles and other safety equipment will be made from our Chicago stock.

All orders, inquiries, etc., should be addressed to us as follows where they will receive the promptest possible service.

F. A. HARDY & CO., Safety Department

Box 804 Chicago, Illinois

"Everything for Safety"

AERO
AUTOMATIC FIRE ALARM

The AERO AUTOMATIC FIRE ALARM "feels" the fire when it starts, locates the flames, and like a flash sounds the alarm.

AERO tells you where to apply a bucket of water—or hand extinguisher—at a time when that bucket of water or chemical will put out the blaze. Quick action! That's the secret of successful fire protection.

The American District Telegraph Company has added to its extensive category of Protection Services, the Aero Automatic Alarm System of Fire Protection.

The Aero System will be installed by the A. D. T. and connected with and operated under the supervision of its Central Stations.

Aero is a well-known Automatic System and its connection with A. D. T. carries the assurance of efficiency and reliability.

Aero operates on the sudden temperature-rise principle and can be adjusted for use under varying temperatures.

The Aero System is applicable for installation in all character of industries and insurance risks.

Write for descriptive information.

Controlled Companies

American District Telegraph Co.

Executive Offices, 30 Church St., New York

Safety Engineering
Magazine of Safety

VOL. XLI. No. 3 MARCH, 1921 25 CENTS

SIC

A NEW SIGN IN SAFETY

BUT OLD FRIENDS ARE BEHIND IT

THE IMPERIAL SAFETY SUPPLIES CO.

Industrial Safety Supplies

Manufacturers of TISCO Machine and Safety Guards and dealers in all dependable safety devices. We Specialize in Personal Service and Solicit Your Inquiries.

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GEO. W. KOSMAN—Vice Pres.—Steel and Structural
JOHN C. EIBEN—2d Vice President—Safety
EARL J. WILSON—Secretary—Electrical Engineer, Ammonia and Hydraulic Advisor
M. J. CUTTER—Treasurer (Member Engineering Section Nat'l Safety Council) } Guards and Safety

Send for our chart on Safety Engineer and Engineering

Address—1316 Ontario Street, Cleveland, Ohio

Safety with Speed and Profit

When safety devices contribute not only to the prevention of accidents but also to a 25% increase in production they commend themselves instantly, not only to safety engineers but the production man.

When belts are shifted by hand it not only results in slowing down machinery, but also necessitates leather belt lacing which is expensive, and even then there is the danger of accident.

For this reason we have developed the

Kleckler Automatic Cone Belt Shifter

which enables the shifting of a belt with one hand and without slowing down the machine. It results in the saving of insurance, and wear and tear on belts and greater production. This shifter is the result of thirty years development and testimonials from all classes of manufacturers testify to its efficiency and economy.

We have a booklet entitled "Safety, Speed, Profit," in which sectional drawings are shown and full particulars of the device with prices given. Send for a copy.

KEUKA INDUSTRIES INC.

Hammondsport, N. Y.

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Safety Engineering
Magazine of Safety

VOL. XLI. No. 4 APRIL, 1921 25 CENTS

Announcing the New Atmos Tubular Breathing Mask

Designed to provide for those industrial services requiring work in poisonous gases at short distances from fresh air and in which a simple light and inexpensive apparatus is desired. Its essential features are:—

1. Rubberized canvas face piece covering eyes, nose and mouth.
2. Atmos perfection respiration valve.
3. Flexible tube from valve to hose line.
4. Leather breast harness and belt.
5. Carrying bag on breast harness for mask when not in use.
6. Specially constructed flexible tubing or hose line. (Both the hose and connections are made strong enough to be used as a life line in emergency.)
7. Funnel with screen at free end of hose.
8. Steel stake with "S" hook attached to be used to anchor the free air end of the hose.
9. Special oxygen injector with gage.
10. One hundred-ft. in 25-ft. lengths with couplings, specially constructed flexible tubing or hose line.

WE ARE INTRODUCING A NUMBER OF NOVEL ARRANGEMENTS OF OUR PRODUCTS WHICH WILL INTEREST YOU. WRITE US FOR DETAILS.

AMERICAN ATMOS CORPORATION

WILKINSBURG STATION, PITTSBURGH, PA.

AN OUNCE OF PROTECTION IS WORTH A TON OF ASHES

Preventing unguarded exposure of your property for a single hour because of the watchman's failure or neglect may save its entire value- Last year we prevented such exposure in 1,000,000 cases of watchman delinquency.

Preventing delay in transmission of fire alarms from your plant to the fire department may save its entire value. Last year we handled 2331 fire alarms from watchmen. Within a few seconds after the watchman turned in the alarm, the fire department was on its way to the fire.

CONTROLLED COMPANIES

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Executive Offices, 30 Church St. New York City

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Safety Engineering
Magazine of Safety

VOL. XLI. No. 5 MAY, 1921 25 CEN

LA FRANCE SAFETY DEVICES
FOR EVERY INDUSTRY

Thousands of manufacturing plants have reported a reduction in the number of accidents and improved efficiency through the use of La-France Safety Devices.

New appliances are constantly being added to the line, whenever our continuous study of industrial needs shows their desirability.

Our extensive facilities are at your service in solving your safety problems.

Write our nearest branch office for Safety Devices Catalogue.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

ELMIRA, N. Y.

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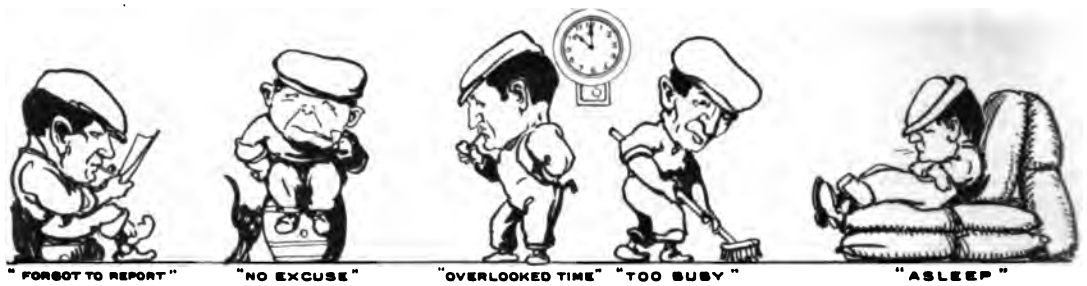

Delinquent Watchmen

Controlled Companies of
American District Telegraph Company

DELINQUENT WATCHMAN REPORT

City All Offices Date 1921

Report on Delinquent Watchmen for year of ... 1920

25071	Forgot to report
8665	Could not get to box on account of obstruction
1834	Building locked, could not get in
54036	Overlooked time
4301	Watchman sick and disabled
55954	Too busy
7786	Asleep
56998	Watchman denies failure
942	Lantern went out
51248	No excuse
3689	Watchman missing
2879	Watchman lost key
2723	Watchman late reporting for duty
2871	Weather prevented
193	Intoxicated
4468	Watchman gone home
1520	Watching suspicious persons
11191	Watch slow and stopped
8818	Ordered not to turn in signal
2097	Did not report because factory was running
2535	New watchman, did not know location of boxes
1342	Horses needed attention
49362	Miscellaneous
360,525	Total delinquent watchmen

Fires reported on Night Watch and Fire Alarm System, this year—1050

Always on Watch PROTECTION A.D.T. SERVICES **Never Sleep**

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VOL. XLI. No. 6 JUNE, 1921 25 CENTS

"Good Morning Chief"—

"Here's something really new. And it's good. It's safety multiplied by two. I don't have to tell you that a Danger sign that says 'Danger' and nothing else DOES NOT conform to the law. To be legal, it must say not only 'Danger,' but WHAT or WHERE the danger is or WHERE it may come from, like the one in my hand. That's sense, isn't it? It puts a man on his guard, and, of course, saves the company a lot of risk and uncertainty.

"Not only that, Chief—but look at the CORNERS on this sign. Not like the usual, old-fashioned one—sharp, dangerous, dagger-like—but ROUNDED; safe. Makes even a Danger sign safe. That's the exclusive STONEHOUSE feature, and it's great! That's why I say these signs prove safety multiplied by two.

"Let's do it right this time, Chief. For these STONEHOUSE Accident Prevention Signs are safety, efficiency and economy all rolled into one. Here's a list of what we need. I'll mail it right out—and get the signs IN."

This applies equally as well to YOUR plant, factory, mine. It tells you facts—and they're TRUE. So specify STONEHOUSE Accident Prevention Signs—and be SAFE!

Get our Catalog

The STONEHOUSE Steel Sign Co.

826 to 842 Larimer Street DENVER, COL.

Westinghouse-Krantz Type C Safety Panels

make it impossible for the operator to sustain injury while operating the switches,—

They are 100% Safe

Metal sectional covers enclose the switches and bus bars; the switch buttons and plug fuses alone being exposed. This gives full protection to the operator against contact with live parts.

Should it be necessary to replace a damaged switch, the sectional cover can be removed and repair made without disconnecting the wires, exposing other switches, or removing the panel from the box.

Westinghouse Electric & Manufacturing Company
Krantz Works—160 Seventh Street, Brooklyn, N. Y.

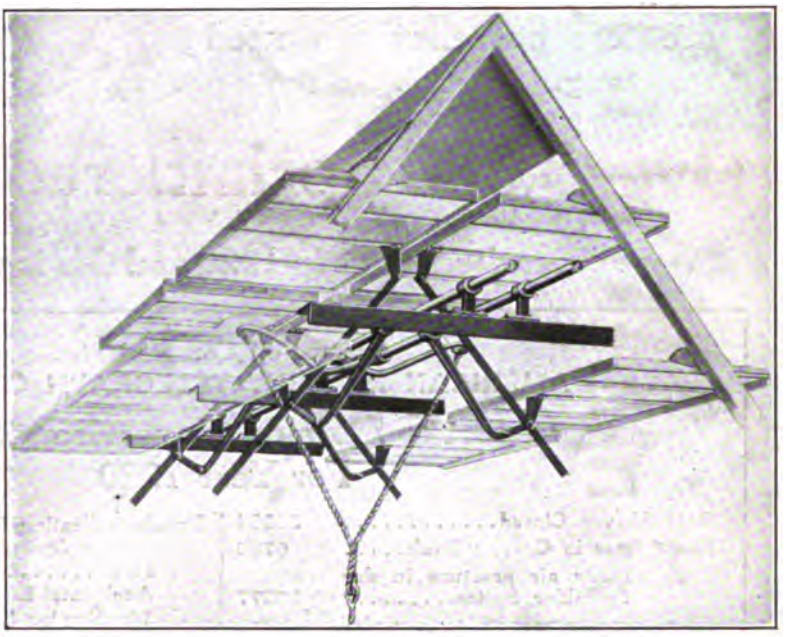
Westinghouse

Safety Engineering
Magazine of Safety

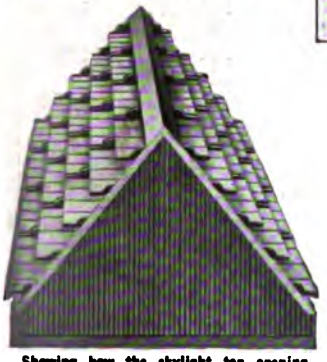
VOL. XLII. No. 1 JULY, 1921 25 CENTS

One rope—and one man—operate this device. In case of fire, either the rope is burnt or a fusible link melted, and the skylight opens automatically by gravity. Note the size of the opening and the fool-proof simplicity of the operating levers. The BOLOGH is the SIMPLEST as well as the best.

Whether open or closed, the BOLOGH Skylight and Gravity Ventilator is absolutely stormproof. No other steel but the curb is needed. BOLOGH does away with turrets and monitor sides.



Patents Pending.



Showing how the skylight top opening equals the well opening. This device has the approval of the Superintendent of Buildings, the Fire Department of the City of New York and the Fire Exchange.

Introducing the New
Bologh Skylight Ventilator

"THERE is a touch of constructional genius," said a prominent engineer, "about this clever, novel and entirely practical device." There is, literally, nothing like it. Briefly, it is a skylight *plus* ventilator, gravity operated, made of structural steel, sheet metal and glass, and rain and snow proof whether open or closed. *The entire top of the skylight opens and allows of an amount of ventilation equal to the skylight well opening.* For the theatre, the school, the factory, office, or industrial building—in fact, *everywhere* where roof lighting and ventilation is needed, the Bologh Skylight and Gravity Ventilator is being accepted as the one and only really practical solution of an always troublesome problem.

Write us for blueprints and full data, or "Look us up in Sweet's."

BOLOGH SKYLIGHT and GRAVITY VENTILATOR CORP.

200 FIFTH AVENUE NEW YORK

Selling Agents for the States of Michigan and Illinois:
THE HOPKINS-LEFEVRE CO., 109 Buhl Building, Detroit, Mich.

Even the most trusted go wrong

Automatic sprinklers are the best of all protection against fire loss but they too need watching.

This is the "supervised" valve that can't go off the job.

Over 3,000 Sprinklered Premises

were supervised by us in 1920 and this is what we found:

Controlled Companies of
AMERICAN DISTRICT TELEGRAPH COMPANY

Report of Sprinkler Supervisory Service For Year 1920

Gate Valves Closed	22334	Signals indicating flow of water in Sprinkler Systems—	
Low Water in Gravity Tank	6760	Fire	515
High or low air pressure in dry pipe Sprinkler System	18277	Accidental Leaks	1864
Low temperature in tank water supply	2790	Working on System and other causes except tests	19032
Low Steam Pressure	1498	No. of buildings equipped with complete Sprinkler Supervisory.	3159
High or Low Water in pressure tank	4335	No. of buildings equipped with Valve Alarm Service only	813
High or Low Air in pressure tank	17591	Total number of Sprinkler Heads Supervised	4429850
Sprinkler Manual Alarms	121		

Always on Watch — PROTECTION A.D.T. SERVICES — Never Sleep

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Executive Offices, 30 Church St. New York City

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Magazine of Safety

VOL. XLII. No. 2 AUGUST, 1921 25 CENT

Randall Appliances are fool-proof; no gates can be left open carelessly; they absolutely interlock; securely lock the gates from the corridor side. They give

Absolute Elevator Safety

Gates cannot be slammed; open all gates to full opening; reduce time in starting and stopping; controller is automatically centered when gate is opened. Other details in free bulletin.

WITH A TWIST OF THE WRIST · CONTROL & SAFETY ·

Randall Elevator Appliances

are for Electric, Hydraulic and Automatic Elevators. A safety-first equipment that has been making good for the past ten years. Know the Randall Controls simply because it is to your advantage to do so.

You are cordially invited to inspect the Randall Control at our office in the new National City Building, 42d St. and Madison Ave., New York, where 15 elevators are equipped with them.

Installed in this building is the Randall "on the job"—an actual demonstration of its great value in elevator operation. Come in and look it over, get acquainted with it, a proposition very much worth while in the way of highly efficient and economical elevator operation, combined with absolute safety to the operator and the public. Come and let us show you its absolutely fool-proof mechanical details.

National City Building

Kerr Elevator Appliance Corporation

17 East 42nd Street, New York City

First Aid for Fire in Factory, Home or Auto

Guardene 2½ gal. soda and acid fire extinguisher—the standard type required in many risks by insurance and other regulations. Approved and labeled by Underwriters' Laboratories.

Hang a Pyrene at an accessible point and you have installed one more effective weapon to fight the ever increasing U. S. fire loss. It is $116,399,000.00 for the first four months of 1921. Over three million Pyrenes are fighting the good fight now, protecting all kinds of buildings, equipment and vehicles.

Twelve years of successful fire fighting recommend Pyrene for:

The Home—It is so simple to operate, a woman or child can use it effectively. It is always ready. Its liquid is harmless to fine clothing or furniture.

The Automobile—One Pyrene will protect the motorist and his car against any fire starting from gasoline, oil or electricity. And it reduces his fire insurance premium 15 per cent.

For Factory—Its simplicity makes every employee within reach of a Pyrene an efficient fireman on any incipient fire caused by gasoline, benzine, acetylene gas, etc. Protects electrical equipment.

Accurate Five-Gallon Pump Tank, with a non-freezing solution. It can be used for outside protection or in unheated buildings. Approved and labeled by Underwriters' Laboratories.

PYRENE MANUFACTURING CO., Inc.

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CHICAGO
17 So. Jefferson St.

ATLANTA
24 Nassau St.

KANSAS CITY
1712 Grand Ave.

SAN FRANCISCO
527 Mission St.

Pyrene Fire Extinguisher—effective on all kinds of fires, especially gasoline, oil and electrical.

Pyrene FIRE APPLIANCES

Firelok, the automatic fire alarm, is hung above; a furnace, electric motors, near bake ovens, drying rooms, or any danger spot where fire may start, or where there is danger of spontaneous combustion. As fire starts, the heat melts the fuse and rings bell 4 minutes. An infallible fire alarm.

1 qt. can Pyrene Liquid for refill.

Caution—When refilling Pyrene Extinguishers insist on using Pyrene Liquid only. Other liquids, such as commercial carbon tetrachloride, cause serious defects which may make the extinguisher inoperative. Pyrene Liquid passes through a patented process to remove impurities and bring it up to the standard required for our guarantee.

Chemical Fire Engines of All Types.

There is a Pyrene Product for Every Class of Fire Protection and Industrial Safety

Safety Engineering
Magazine of Safety

VOL. XLII. No. 3 SEPTEMBER, 1921 25 CENTS

SIC

Make Walking Safe

Every stair tread, door saddle, floor plate, trench and manhole cover, running board, floor around power driven machinery, car step and the like, is an imminent danger spot unless made safe through the use of an effective anti-slip material. Falls on unprotected walkways are responsible for more deaths—five to one—than fires, and are the most prolific cause of serious injury.

FERALUN makes walking surfaces safe. It is made of tough, resisting metal with an abrasive grit embedded in its wearing surface, is free from tripping grooves and projections, stays flat, is long-lived and all things considered is decidedly low in initial cost.

There are 20,000 installations of FERALUN on New York City subway stairs, and in public places in every large city. It is working all the time. Look it over. Ask for samples and prices,—start something for your own ultimate peace of mind and financial betterment.

AMERICAN ABRASIVE METALS CO.
Fifty Church Street, New York, N. Y.

feralun

ANTI-SLIP-TREADS

Catch The Fire The Minute It Starts

THAT you insure your property against fire is an evidence of your keen appreciation of the importance of protecting your business and profits and the interests of your trade.

Insurance will compensate you for losses by fire, but time, labor and money are required to restore your property and recover the trade of your old customers who, of necessity, are compelled to go elsewhere for their supplies.

Send for This Booklet

THE system operates on the expansion of air principle. Its operation does not require a high degree of heat to reach some fixed point in the ceiling. Even a small fire will cause the System to quickly function and automatically bring into operation all of the signalling devices, both local and at the central station.

Guarantee Your Profits by Adequate Fire Protection

NO FIRE, however remote its location, can escape instant detection. The fire itself automatically causes an alarm to be sounded in the Central Station and throughout your premises and the City Fire Department is immediately summoned to render necessary assistance. The effectiveness of the system in catching the fire at its very beginning, permits three-fourths of fires to be put out even before the Fire Department arrives.

Aero "Feels" Fire Instantly.
Aero Always Certain to Act.
Adjustable to All Conditions.
Stationed Every Ten Feet.
Approved By National Board of Underwriters.

Always on Watch PROTECTION A.D.T. SERVICES **Never Sleep**

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AMERICAN DISTRICT TELEGRAPH CO.

Executive Offices, 183 Varick Street - New York City

Safety Engineering Magazine of Safety

VOL. XLII. No. 6 DECEMBER, 1921 25 CENTS

Prevent Waste—Save Expense in the use of First Aid Materials

THE ordinary First Aid cabinet wastes as much material as is used. The excitement incident to an accident causes unnecessary use and damage that is expensive. Individual Dressing Packets stop all waste. They furnish all the treatment possible with any other form of First Aid, and are the most economical, efficient, practical and convenient form in which to supply First Aid materials. The picture shows an average Packet. Each Packet contains one or more First Aid Dressings or Treatments for a definite injury or collapse; specially prepared, ready for instant use, complete in itself, and sufficient for the purpose. There can be no waste in their use. They are the most efficient First Aid materials for office, shop or factory; for male or female help; single or group workers in isolated locations; and for all minor or major injuries in any industry.

HYGIENIC - MADE

Individual Dressing Packets

are packed in Kits containing Dressings and Treatments for any possibly injury and for all classes of help in any industry. They provide adequate protection wherever the services of physician or nurse are not immediately available. There is a Kit adapted to your particular needs, containing I. D. P. to cover any hazards under which your people work. Or, we will design and equip a special Kit for your requirements.

The Only First Aid Equipment complying with the specifications of the Accident Prevention Committee of National Electric Light Association.

Specifications and Prices Upon Request

Upon request, we will send detailed information covering this method of furnishing First Aid, with prices that will prove the economy of Individual Dressing Packets.

HYGIENIC FIBRE COMPANY

First Aid Department

200 Broadway New York City

A NEW DEVELOPMENT IN SMALL A. C. MOTOR STARTERS

The small alternating current motor starters of the Westinghouse WK line are revolutionary in character.

Type WK starters are 100 per cent safe. The operator cannot touch live parts under any circumstances.

They protect the motor from overloads both when starting and when running, and also from phase failure.

A type with additional low voltage protection is also supplied on the WK-100.

Westinghouse quality in construction guarantees thorough reliability and long life.

Easy to install. Renewals of all wearing parts can be made without disturbing conduits, connections, or box setting.

Type WK-100	Up to 3 hp. 110 volts, 10 hp. 250 volts, 15 hp. 550 volts.
Type WK-30	Up to 3 hp. 110 volts, 10 hp. 250 volts, 10 hp. 600 volts.
Type WK-20	Up to 5 hp. all voltages up to 550.
Type WK-10	Up to 2 hp. all voltages up to 550.

Catalogue 12-A gives full information and prices on Westinghouse "100 per cent safe" starters, switches, panels, and switchboards. Send for a copy.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
Krantz Works—100 Seventh St., Brooklyn, N. Y.

Westinghouse

L70 for Acetylene Cutters

A light but durable goggle of the fiber cup type with sweat-proof, non-irritating padding.

Equipped with Willson Industro curved Lenses protected by clear cover glass.

This goggle has been tested and approved, and is inspected in our plant, by The Underwriters' Laboratories.

You will agree with us that for comfortable protection there is no better safety goggle for cutting with gas.

New list price of L70, $14.40 per dozen, f. o. b. Reading.

WILLSON GOGGLES INC.

Factory and Main Offices, Reading, Pa.

PITTSBURGH	CHICAGO	SAN FRANCISCO	TORONTO
Magee Building	Mallers Building	140 Geary Street	23 Scott Street

Remember You Saw This in Safety Engineering

Safety Engineering

Three publications have been combined with Safety Engineering:
FIRE PREVENTION, CONSERVATION and PROTECTION ENGINEERING

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CONTENTS FOR DECEMBER, 1921 (VOL. XLII, No. 6)

WHERE FIRE DANGERS ARE INCONSISTENT..... 251

A MAN'S CASH VALUE TO SOCIETY..... 252

ACCIDENT PREVENTION IN THE RUBBER INDUSTRY
By H. S. Poole.. 254

Fire. Accidents Due to Small Tools. Hazardous Machinery. Calenders. Protecting Calender Employes. Instruction in Use of Safety Trips Necessary. Tubing Machines. Power Driven Punch Presses. Pressure Vulcanizers. Vapor Poisoning. Accident Report Systems.

DIAGNOSIS OF HAZARDOUS OCCUPATIONS..... 259

WHAT THE SAFETY INSPECTOR MUST DO AND WHAT HE HAS DONE.....By J. G. Shaw.. 260

CANADIAN ENGINEERING STANDARDS 262

THE FIGHT AGAINST WHITE LEAD..... 263

INDUSTRIAL STANDARDIZATION 264

ELECTRICAL HAZARDS ARE MORE DANGEROUS THAN MECHANICAL ONES.....By W. J. Pefferly.. 265

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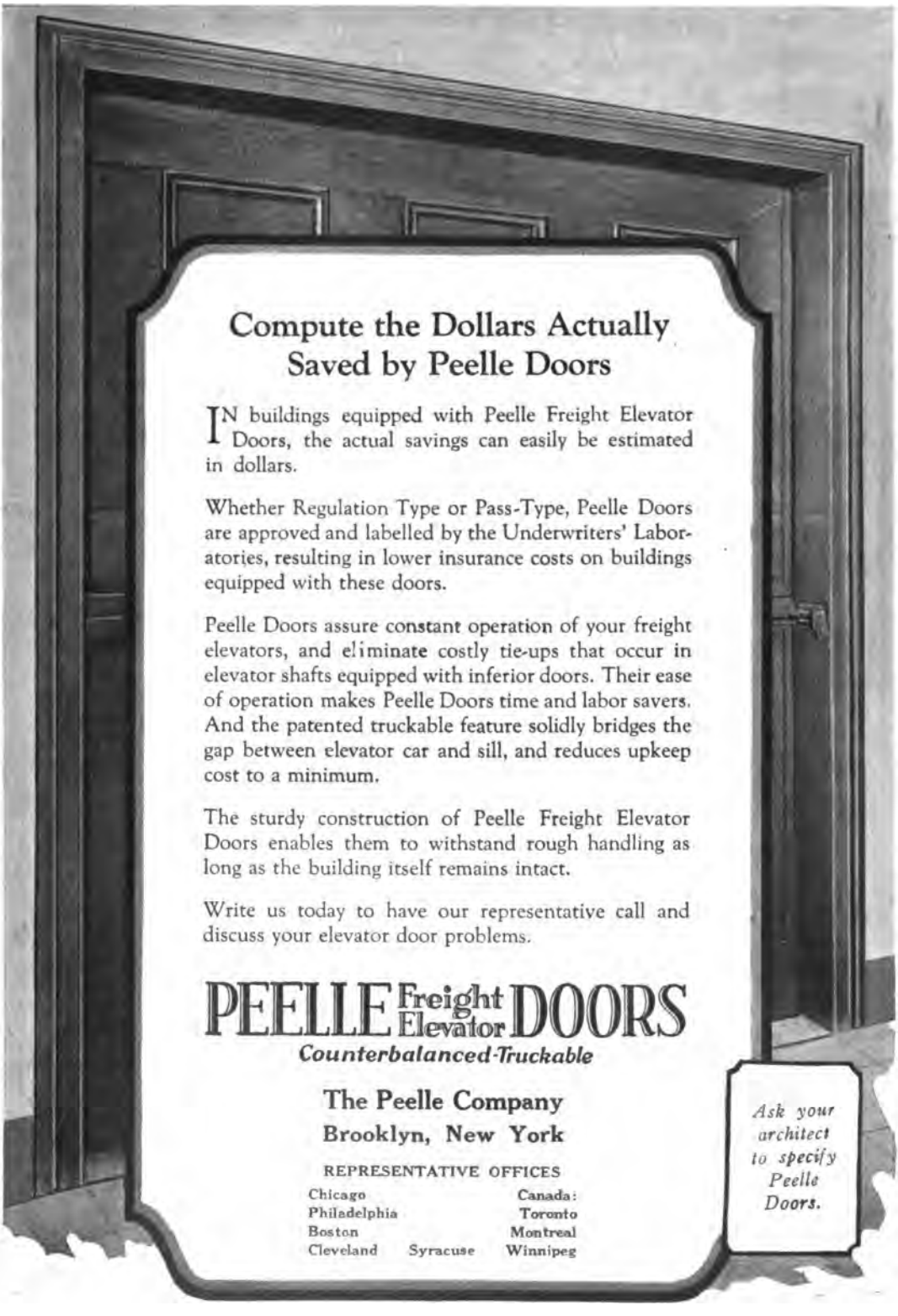
SURVEY OF SAFETY LITERATURE..... 268

Largest Safety Libraries. Special Libraries Directory Edited by Dorsey W. Hyde, Jr.

EDITORIAL 269

The Art of Safety Posters at Hôme and Abroad. Scott Was Not Connected with Industrial Safety. Dates Back to Deuteronomy.

(Continued on page 4)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CONTENTS FOR DECEMBER—Continued

THE FATAL STAIRCASE..... 270

ELECTRICITY AND "ELECTRICITY"....By C. Albert Gasser.. 271

CHLORINATING SYSTEM FOR TANNERIES..... 272

SAFETY DEMANDS AMERICANIZATION..By L. M. Stowell.. 273

OBEY THE LAW OR PAY THE PRICE..... 274

SAFETY NEWS AND COMMENT..... 275

Home Movies and Decorations. Safety on the Roads. Industrial Accidents in Wisconsin. More Automobile Accidents. Railroad Fatalities Reduced. Promptness Vital with Cancer. Course in Industrial Nursing. Office Safety Display. Specifying Portland Cement. For Uniform Contracting Practice. Exhibitors at the Pennsylvania Industrial Relations Conference, Harrisburg, October 24-27, 1921. Steel Company's Exhibit. Activity in "Inland Empire." Dean Cooley Honored by Federated American Engineering Societies. Employment Research and Safety. No-English and Accidents. Fire and Accident Prevention Bodies Elect Officers. Accidents in Shipbuilding Plant. Indiana Industrial Accidents. Safety Against Anthrax. Pneumonia, Diphtheria, Typhoid. Tuberculosis and Life Insurance. Typhoid Fever Vanishing. Unsafe Conditions Corrected. Redmond Syracuse Manager. Equipping Yard Engines for Safety. The End of the Man and the Match. Premature Explosions in Quarries. Hazards of Floating Oil on Rivers. Mine Accident Rates, Copper and Coal.

AMERICAN SOCIETY OF SAFETY ENGINEERS..... 283

December Meeting. Executive Board Meeting. Boston Section. Electrical Power Control Code. Proposed A. S. S. E. Text Book on Safety Engineering.

THE MAN ON THE JOB..... 285

Safety "Razz" and "Jazz." Getting Interest in Safety. Prizes for November Articles. Comments by Members of the November Committee.

ACCIDENTS IN PAPER AND PULP MILLS..... 287

RECENT FIRES AND THEIR LESSONS..... 288

Dwellings, Palatial. Department Stores.

MATERIALS, APPARATUS, PROCESSES..... 290

Safe Windows. Bullard Firm in Los Angeles. Hose Connectors for Railway Cars. New Chemical Compound Freeze-Proof. Guard Materials Not Wire Only. Cutler-Hammer Catalog. New McNutt Can. Exhibits at the Harrisburg Industrial Conference: Views of Aisles.

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INDEX TO ADVERTISERS

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A

Allis-Chalmers Co..... 19
American Abrasive Metals Co..... 8
American-La France Fire Engine Co., Back Cover
American Society of Safety Engineers 9
Associated Manufacturers of Safety Standard Film & Projectors, Inc..... 22

B

Badger Fire Extinguisher Co..... 10
Books 11-14-19-21
Bullard, E. D..... 22

C

Consolidated Engine Stop Co., Inc..... 20
Croker National Fire Prev. Eng. Co... 20

D

Davis & Geck 8

E

Eastern Machinery Co..... 19
Eastman, Samuel, Co..... 17
Erdle Perforating Co..... 17

H

Harrington & King Perforating Co.... 15
Hausburg, E. O..... 21
Hirsch-Crawford Co..... 22
Howard Clock Co., E..... 22
Hygienic Fibre Co.....Front Cover

K

Keuka Industries, Inc..... 19
King Optical Co., Julius..... 7

L

London Guarantee & Accident Co..... 21

M

Maryland Casualty Co..... 13
Maurer, Henry, & Son..... 12
Mosso, C. A., Laboratories..... 16
Mundt, Charles, & Sons..... 16

N

National Founders Association..... 16
Norwich Wire Works, Inc..... 12

P

Peelle Co..... 3
Pulmosan Safety Equipment Co..... 21
Pyrene Mfg. Co. 5

R

Richmond Safety Gate Co..... 21
Royal Safety Anchor Co..... 22
Rundle-Spence Mfg. Co..... 13

S

Safetee Glass Co. 20
Smith & Egge Mfg. Co..... 22
Stonehouse Steel Sign Co..... 22

T

Taylor-Shantz Co..... 22
Travelers Insurance Co. Inside Back Cover

U

Universal Safety Tread Co..... 15

V

Viche Safety Toe Board Co..... 21

W

Western Glass Co..... 10
Westinghouse Electric & Mfg. Co., Inside Front Cover
Willson Goggles, Inc..... 1

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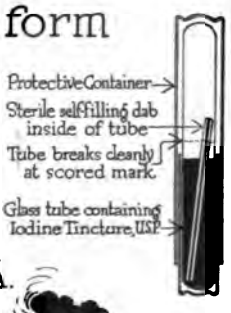
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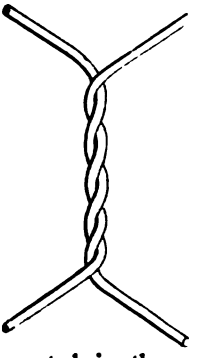

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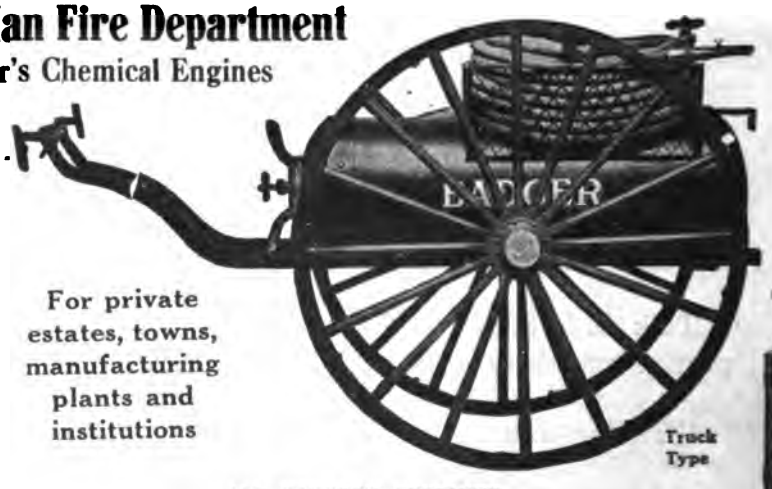

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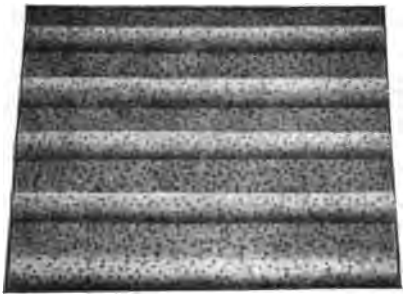

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Welding
—Guards
Belt
Grinding Wheel
Punch Press
Jointer
Saw
Screens
—Insurance
Fire (with free advisory Fire Protection Service)
Group (with Free Advisory Service for Safety, Sanitation, etc.)
Workmen's Compensation
—Ladders, Ladder Feet
—Lamps, Portable Electric
Miners'
—Lighting
Fixtures
Lamps
Reflectors
—Lightning Protectors
Rods
—Motion Picture Films
—Motion Picture Projectors
—Oilers, Safety
—One-Piece Working Garments
—Overalls
—Oxygen Breathing Apparatus
—Paper Cups
—Paper Towels
—Pipe Covering
Asbestos
Cork
—Play Ground Equipment
—Respirators
—Sand Blast Exhausters
—Sand Blast Hoods and Helmets
—Set Screws, Safety
—Soap Dispensers, Sanitary
—Shoes, Safety
—Signs
Danger and Warning
—Suggestion Boxes
—Switches, Safety
—Telephones
Mine
Shop
—Toilet Fixtures, Sanitary
Bowls
Partitions
Urinals
—Transmission Machinery
—Treads, Safety
—Ventilators
—Ventilating Systems
—Wash Basins, Sanitary
—Water Sterilizers
—Watchmen's Clocks
—Welding and Cutting Torches
—Window Cleaners' Belts
—Wire Glass

Name ..... Position .....

Name of Company ..... Address .....

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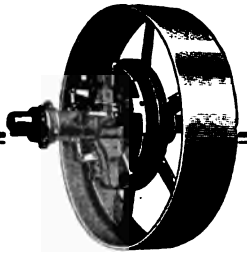

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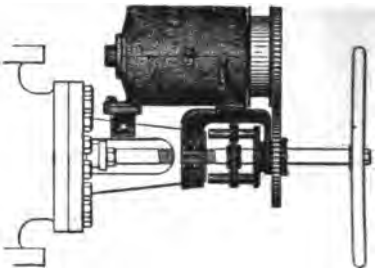

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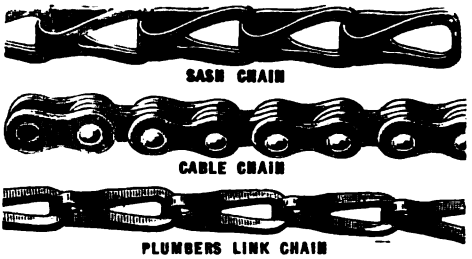

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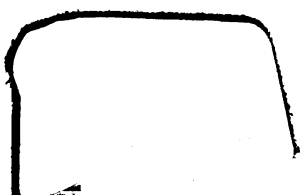
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